SEGA® COMPUTER

The Official Sega User Club Magazine

JULY/AUGUST 1986

In this Issue:
KARATE
SEGA BASE PATCH
'SEGA IS SUPREME' COMPETITON
NEWS AND REVIEWS
WORD PROCESSING WITH YOUR SEGA
HACKERS CORNER
SEGA PROGRAMMING Part 1

SEGA®
COMPUTER

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All contributions welcome. Name, address and phone number must be included.

All software programs published by the magazine become the property of Sega Software Support unless by prior arrangement. They are accepted on the basis that they are the original work of the author. The programs must be submitted on tape or disc and a printed listing is desirable. Software is not returned unless accompanied by a stamped self addressed envelope.

For overseas contributions, please enclose a $1 note/coin of the country of origin if software is to be returned.

A plea for software listings - please check your software thoroughly for errors and spelling before sending it to us. Please update us on any errors you know about so that we can publish corrections.

We pay $NZ20.00 for the feature software program published each month and $NZ4.00 for all other full programs published.

Articles or reviews must be legible. Articles or reviews are paid $NZ4.00 per page on a prorata basis.

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SEGA USER CLUB

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Membership includes a subscription to the Club magazine SEGA COMPUTER as well as qualifying for other club benefits.

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Here it is! The first "official" magazine from Sega Software Support. To those who received faulty copies of the May/June issue our apologies - there must have been gremlins at work.

What a hectic couple of months it has been since we took over from Grandstand. What with the catalogue and the deluge of orders that resulted from it, then trying to bring the magazine back into the right time-frame, the family think their throats have been cut having constant hamburgers and/or fish and chips for tea.

We have a great line-up of programs, reviews and the first instalment of Sega Programming, for you in this issue. Our thanks to those who have contributed, without contributions we wouldn't have a magazine worth publishing. Keep up the good work!

In the centre of this issue you'll find a TERRIFIC competition with some FANTASTIC prizes. Get your entries in before October 10 to qualify for the draw on October 15.

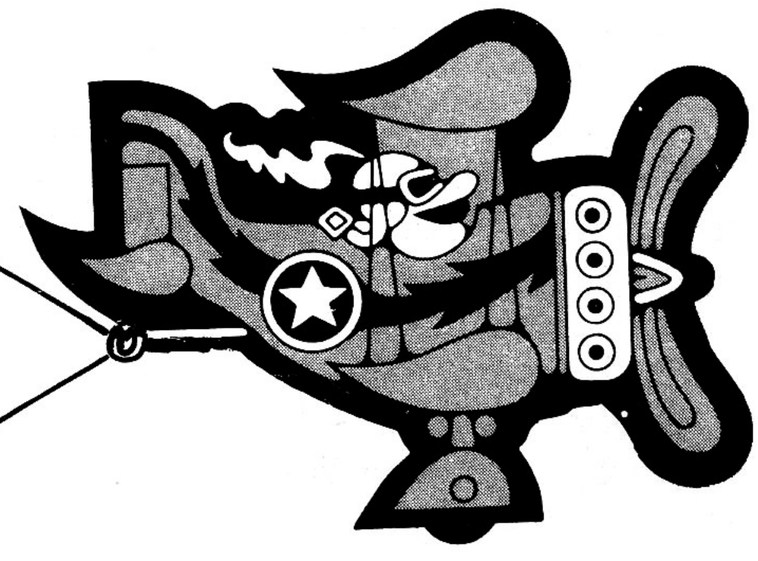
Included with the competition is a survey form. We want to know what YOU want in YOUR magazine. It's vital that you return it so that the magazine can more accurately reflect what you want.

Don't forget your survey form MUST be returned with your competition entry to be in the draw.

Now on with the magazine.

Glenys Millington
EDITOR

LETTERS ... to THE EDITOR.



DEAR EDITOR

I am trying to get a Sega User Club going in Rotorua. I have advertised on the radio and in your magazine. I have had ONE reply! If there are any Sega users out there please contact me on Ph. 59-325. Thank you.

Terry Cole, Rotorua

EDITOR'S REPLY

Come on all you Rotoruaians, I know there are plenty of you out there with Sega's. Give Terry a call - you'll be amazed at how much you can learn and how much fun User Groups can be.

DEAR EDITOR

Just a note to say I'm glad that support is being maintained (and hopefully improved) for the Sega.

Regarding the magazine, here is a request that you keep up the educational component: ie. more concerning machine code, memory mapping, accessing the other two screens and how to create high-res graphics. Keep up the good work!

Paul Dumble, Hamilton

DEAR EDITOR

I have a question. John Sands (Australia) were advertising Sega computers with 32K RAM expandable to 48K. Is there likely to be any further hardware made available to say double these figures?. I am finding the present 32K insufficient particularly with disk drive.

R J Thorpe, Napier

EDITOR'S REPLY

All we have heard is that Scott McDonald in Sydeny is writing a new version of the BASIC which will release 40K for programming. As yet, this has not been completed. Everyone will be advised when it is ready via the magazine.

DEAR EDITOR

Recently I purchased the program Empire and the book 'More Than 50 Programs' for the Sega 3000. Upon listing the program I found an error in line 1450 which reads - IF R = 8 THEN FOR N1 = 1 to Z: GOSUB 4000:NEXT N1. I found that line 4000 does not exist. In the book I found an error in the program called The Land Of Sorcery on line 350 which reads INPUT Q:Q = INT(Q) IF Q (O or Q)4 THEN 610. 610 does not exist and the program only goes up to line 590. I would be grateful for the corrections as I would like to get the programs working correctly.

Jeremy Bennett, Henderson

EDITOR'S REPLY

Try this. 4000 CLS:PRINT "CONGRATULATIONS PRIME MINISTER!!":FOR II = 1 TO 400:RETURN and for the second 610 GOTO 350. Add these lines in and see if the programs continue.

DEAR EDITOR

Due to a recent spell in bed with a dose of the Waikato "greebies" I had the opportunity to re-read all my back copies of the Sega magazine, but instead of solving one or two problems I seem to have more than I started with - HELP!!!

1. In the very first magazine R Sloane wrote asking about 225 hues of colour produceable. The answer mentioned a program, but no program was printed. What was the program?
2. In the Christmas edition, on page 30, a maths program gives - line 50 X$ = X$ + / − X$ with no + / − key - how do I enter that on?
3. I picked up a copy of another NZ computer mag which gave a machine code program and a sentence as follows:- "Appended is the same program in the (Basic) format which can be run on the Sega". Does this mean M/C programs cannot be entered without some special formula?. And lastly
4. Could you please produce a program which could produce random lists of letters inputted and no repeated letters in the lists unless of course the letters were duplicated in the inputted word.

Thanks for the continuing interesting magazine, I hope the change of management will prove beneficial.

B Turnell, Waikeria

EDITOR'S REPLY

1. See page 19 same issue.
2. Enter + , not + / −
3. Yes, because the internal ROM addresses are different. Knowledge is required rather than formula!
4. A challenge for our readers. I know someone who once wrote one but the problem is that the total number of combinations from a word of n letters is n! (ie. for 10 letter word it is 10 x 9 x 8 x 7 x 6 x 5 x 4 x 3 x 2 x 1 = 3,628,800. To use r letters from a n letter word the formula is n!/(n-r)! All this means is that a 10 letter word can generate mountains of combinations and you would need to visually sort through them yourself or run them through a dictionary program somehow.

DEAR EDITOR

Since writing to you last time one additional matter has come to mind. It would be very interesting and in some cases critical to know how much space each program listed in the club magazine or any book takes up. This applies not only to games programs but to the various software programs. For example the Sega "Easy Writer" program available on tape takes up just over 8K bytes.

Where people like myself put several games or whatever on the one program then such information is critical. It is a little frustrating copying most of a program into the computer only to find there is insufficient space to complete it.

Now for a problem from the Fair goat department. I have a copy on tape of a game called Empire produced by Sega

Grandstand. It has an error in it. On finally achieving the status of Prime Minister you are not congratulated or anything like that, but told there is an ERROR. The problem is that at this stage the program is told to go to subroutine 4000 and there is no line 4000. Obviously something is missing!
Have you thought of having as part of the club a suggestion box with a reward system. If someone makes a really good suggestion that is usable either in the magazine of any of the software then they will get say a $5.00 discount off their next software purchase. Might worth a try in order to get some feedback. Just a thought but if used would obviously qualify for the first discount voucher.
Keith Hovell, Dunedin

EDITOR'S REPLY
1. The best we can do is advise whether the program is only suitable for 32K.
2. Re Empire - refer to our answer to Jeremy Bennett
3. You'll notice our reward system on the first page ... and we pay in CASH!!

DEAR EDITOR
I have had my Sega for about a month but have not as yet joined the Users Club. I borrowed some magazines from a friend. I like the programs you print in them. I am writing to ask if you can help me with a problem I have with a cassette of mine - it's called 'The Young 'ns'. It doesn't give any instructions on how to play the game. It simply says "you are in a cabin, atmosphere is hot, visible items - bunk, exits east. If you go east you die. It then asks you if you want another game but you can't - the keyboard is disabled. If you could help me with this and send me a reply I would greatly appreciate it.
Ian Bilton

EDITOR'S REPLY
Unfortunately Ian, you forgot to include your address with your letter so I have not been able to contact you. The problem you have with the keyboard can be corrected if you send your tape to us for modification. For those readers who have purchased this game without hint-sheets, the clues are listed later in this magazine .. or alternatively send us your name and address and we'll send you a copy.

DEAR EDITOR
I am enquiring on how to operate my data recorder for my computer. It says I need a 16K or 32K cartridge, I've got a 26K, would that matter? It also says to have your tone on high and I haven't got a tone dial. My data recorder is a Euromatic C630.
John Chambers, Russell

EDITOR'S REPLY
The cartridge you have is a 32K which uses a certain amount of memory to run the computer which leaves you with 26K. As with the Sega dataset the Euromatic tone is automatically set. Side two of most cassettes is recorded at the correct level for both these machines.

DEAR EDITOR
Five to six months ago I wrote to the magazine with one or two "minor complaints" but no answer has been printed. My comments covered the programs published in the magazine requesting that info be given to show whether or not they were suitable for the 16K, 32K and/or with the disk drive. I have the 16K cartridge and a disk drive and late last year spent hours typing a program only to find it would not work on the disk drive. this was the "Jet Ranger" page 20 Sept/Oct 1985 issue. I will however run it with my 16K cartridge.
I now have two further questions.
1. How is M. Howards book on Machine Code coming along?
2. How is the "Lightning Disk Basic" version coming along? (Refer page 19 Christmas issue 1985)
O A Scannell, Raumati Beach

EDITOR'S REPLY
1. Refer my answer to Keith Hovel
2. The machine code book should be published early next year!
3. See above for the improved disk BASIC.

DEAR EDITOR
RE R J Thorpe's question concerning Hu Cal Sort Function (May/June Letters to the Editor).
The answer to your question is quite simple. The "keys" are "the key to your sort". That is to say, they determine which column (A-IU) you wish the sort to be carried out on.
The examples below should make it clear:
1. This is a test table and is shown in ASCENDING order with reference to COLUMN A. Columns B and C show the christian and surnames of 5 people.
2. The test table has been sorted by one key (column A) in a DESCENDING order.
3. The test table has been sorted by one key (column B) in an ASCENDING order. (In order of christian names only).
4. The test table has been sorted by one key (column C) in an ASCENDING order. (In order of surnames only).
5. The test table has been sorted by two keys (key 1 = column B key 2 = column C) in an ASCENDING order. (In order of christian names first then by surnames).
6. The test table has been sorted by two keys (key 1 = column C key 2 = column B) in an ASCENDING order. (In order of surnames first then by christian names).
Note that when sorting by one key only and there are two or more entries that are the same, they are placed in the order that the sorting process finds them. Under experimentation, it first appeared that the sort was initiated from the bottom of the table but this does not appear to be constant.
To overcome this problem it is necessary to sort by two or three keys. This is shown in examples 5 and 6 where the names are sorted firstly by CHRISTIAN NAMES then SURNAMES (example 5) and then by SURNAMES followed by CHRISTIAN NAMES.
I hope that this will answer R J Thorpe's question. If not you may refer him to me (Selwyn Easton of the Pukekohe Users Group as listed in the magazine).
Selwyn Easton, Pukekohe

DEAR EDITOR
We look forward to each issue of your fascinating magazine. Please keep it up.
1. **Cat Danger** While my daughter and I were compiling a program her cat stalked into the room, tail rampart as usual when he thinks he owns the house. The tip of his tail touched the cartridge end of the Sega, which was on a low table, and in an instant a fortnights laborious programming completely vanished. Conclusion:- Table height should be at least 55cm if there are cats about.
2. Can you suggest why our SP400 printer sometimes runs out of steam a little way through a program and returns to origin and stops. (Sometimes it even does this with the test program). The only cure we have found when it is in this mood is to load "Easy Writer" and print two or three paragraphs. After that the printer behaves normally. Is this a common (or could it be the cat again?).
3. Enclosed is a Bar Graph program. You might say it's a long program for a short result. What we would really like to

continued on p. 31

KARATE

. . . Craig 'Yie Arrgghh' Martin

This program has to be one of the best programs we have ever published in the mag. It is fast, furious and a lot of fun.

This two player game has really great graphics, and puts you in command of a dangerous fighting warrior, you can control his kicks, jumps and punches etc.
The object is simple, murder the other bloke!

I think that the program will only work on the 32K Sega, or in conjunction with a SF-7000 but try it anyway!
A 16K version is available on tape from us

```
10 GOSUB 7000
20 REM
30 REM  KARATE  CRAIG MARTIN/1986
40 REM
50 SCREEN1,1:CURSOR13,23:PRINT"PRESS FIRE"
60 IFSTRIG(1)ORSTRIG(2)>0THEN80
70 GOTO60
80 SCREEN2,2:K=50:K1=146
90 MAG3:S=0:S1=4:X=150:X1=122:X6=43:X7=43:X8=43:X9=43
100 SPRITE0,(150,150),0,1
110 SPRITE1,(122,150),4,6
120 FORI=1TO200:NEXT:COLOR15
130 SOUND4,1,15:CURSOR137,138:PRINT"BEGIN":SOUND0
140 FORI=1TO200:NEXT:BLINE(136,138)-(180,144),,BF
150 REM        PLAYING  STANCES
160 REM
170 Y1=150:SPRITE1,(X1,Y1),S1,6
180 ONSTICK(1)GOTO240,190,370,190,410,190,450,190
190 ONSTRIG(1)GOTO530,1460,2120
200 Y=150:SPRITE0,(X,Y),S,1
210 ONSTICK(2)GOTO300,220,390,220,430,220,470,220
220 ONSTRIG(2)GOTO670,810,2480
230 GOTO170
240 IFS>8THENS=S-40:GOTO200
250 Y=134:FORU=1TO4:F=STRIG(1):G=STICK(2)
260 IFG=7ANDS1<=8THENX1=X1-5
270 IFG=5ANDS1<8THENS1=S1+40
280 ONFGOTO1210,1690,1940
290 SPRITE0,(X,Y),S+40,1:SPRITE1,(X1,Y1),S1,6:NEXT:GOTO200
300 IFS1>8THENS1=S1-40:GOTO170
310 Y1=134:FORU=1TO4:F=STRIG(2):G=STICK(1)
320 IFG=7ANDS<8THENX=X-5
330 IFG=5ANDS<8THENS=S+40
340 ONFGOTO1330,1820,2030
350 IFF=2THEN1820
360 SPRITE1,(X1,Y1),S1+40,6:SPRITE0,(X,Y),S,1:NEXTU:GOTO170
370 IFS<8THENX=X+5
380 GOTO200
390 IFS1<8THENX1=X1+5
400 GOTO170
410 S=S+40:IFS>44THENS=S-40
420 GOTO200
430 S1=S1+40:IFS1>44THENS1=S1-40
440 GOTO170
450 IFS<8THENX=X-5
460 GOTO200
470 IFS1<8THENX1=X1-5
480 GOTO170
490 IFS=40THEN950
500 REM
510 REM SNAP KICK HEAD (BLACK,LEFT)
520 REM
530 IFS>8THEN950
540 IFS=4THENX=X-16
```

```
550 SPRITE0,(X,Y),16,1
560 IFSTICK(2)=5THENS1=S1+40:IFS1>44THENS1=S1-40
570 IFSTICK(2)=7ANDS1=4THENS1=28
580 SOUND4,0,10:SPRITE1,,S1,6:SPRITE0,(X,Y),8,1:XX=X-X1:IFS1>8THEN630
590 IFS1=0THEN620
600 IFXX<=6ANDXX>=-5THENSOUND4,2,15:X6=X6-2:GOSUB3360
610 GOTO630
620 IFXX<=28ANDXX>=20THENSOUND4,2,15:X6=X6-2:GOSUB3360
630 SOUND0:SPRITE0,(X,Y),16,1:S=0:IFS1=28THENS1=4
640 GOTO200
650 REM      SNAP KICK HEAD (RED,LEFT)
660 REM
670 IFS1>8THEN1040
680 IFS1=4THENX1=X1-16
690 SPRITE1,(X1,Y1),16,6
700 IFSTICK(1)=5THENS=S+40:IFS>44THENS=S-40
710 IFSTICK(1)=7ANDS=4THENS=28
720 SOUND4,0,10:SPRITE1,(X1,Y1),8,6:XX=X-X1:SPRITE0,,S,1:IFS>8THEN770
730 IFS=0THEN760
740 IFXX<=4ANDXX>=-5THENSOUND4,2,15:X8=X8-2:GOSUB3380
750 GOTO770
760 IFXX>=-29ANDXX<=-18THENSOUND4,2,15:X8=X8-2:GOSUB3380
770 SOUND0:SPRITE1,(X1,Y1),16,6:S1=0:IFS=28THENS=4
780 GOTO170
790 REM      SNAP KICK HEAD (RED,RIGHT)
800 REM
810 IFS1>8THEN1130
820 IFS1=0THENX1=X1+16
830 SPRITE1,(X1,Y1),20,6
840 IFSTICK(1)=5THENS=S+40:IFS>44THENS=S-40
850 IFSTICK(1)=3ANDS=0THENS=24
860 SOUND4,0,10:SPRITE1,(X1,Y1),12,6:XX=X-X1:SPRITE0,,S,1:IFS>8THEN910
870 IFS=0THEN900
880 IFXX<=2SANDXX>=19THENSOUND4,2,15:X8=X6-2:GOSUB3380
890 GOTO910
900 IFXX>=-2ANDXX<=7THENSOUND4,2,15:X8=X8-2:GOSUB3380
910 SOUND0:SPRITE1,(X1,Y1),20,6:S1=4:IFS=24THENS=0
920 GOTO170
930 REM    LOW KICK    (BLACK,LEFT)
940 REM
950 IFS=44THENX=X-16
960 SOUND4,0,10:SPRITE0,(X,Y),48,1:XX=X-X1:IFS1=0OR81=40THEN990
970 IFXX<=15ANDXX>=-2THENSOUND4,2,15:X6=X6-1:GOSUB3360
980 GOTO1000
990 IFXX<=30ANDXX>=15THENSOUND4,2,15:X6=X6-1:GJSUB3360
1000 SOUND0:S=40:GOTO200
1010 REM
1020 REM    LOW KICK    (RED,LEFT)
1030 REM
1040 IFS1=44THENX1=X1-16
1050 SOUND4,0,10:SPRITE1,(X1,Y1),48,6:XX=X-X1:IFS=0ORS=40THEN1080
1060 IFXX>=-15ANDXX<=0THENSOUND4,2,15:X8=X8-1:GOSUB3380
1070 GOTO1090
1080 IFXX>=-30ANDXX<=-13THENSOUND4,2,15:X8=X8-1:GOSUB3380
1090 SOUND0:S1=40:GOTO170
1100 REM
1110 REM    LOW KICK    (RED,RIGHT)
1120 REM
1130 IFS1=40THENX1=X1+16
1140 SOUND4,0,10:SPRITE1,(X1,Y1),52,6:XX=X-X1:IFS=0ORS=40THEN1170
1150 IFXX>=14ANDXX<=29THENSOUND4,2,15:X8=X8-1:GOSUB3380
1160 GOTO1180
1170 IFXX<=14ANDXX>=-1THENSOUND4,2,15:X8=X8-1:GOSUB3380
1180 SOUND0:S1=44:GOTO170
1190 REM
1200 REM JUMPING SIDE KICK (BLACK,LEFT)     REM
1210 IFSTICK(2)=5THENS1=S1+40:IFS1>44THENS1=S1-40
1220 IFSTICK(2)=7ANDS1=4THENS1=28
1230 SPRITE1,,S1,6
1240 SOUND4,0,10:X=X-10:SPRITE0,(X,Y-8),56,1:XX=X-X1:IFS1>8THEN1290
1250 IFS1=0THEN1280
1260 IFXX<=5ANDXX>=-5THENSOUND4,2,15:X6=X6-6:GOSUB3360
```

```
1270 GOTO1290
1280 IFXX<=29ANDXX>=18THENSOUND4,2,15:X6=X6-6:GOSUB3360
1290 FORI=1TO20:NEXT:SOUND0:S=0:IFS1=28THENS1=4
1300 GOTO200
1310 REM
1320 REM JUMPING SIDE KICK (RED,LEFT)       REM
1330 IFSTICK(1)=5THENS=S+40:IFS>44THENS=S-40
1340 IFSTICK(1)=7ANDS=4THENS=28
1350 SPRITE0,,S,1
1360 SOUND4,0,10:X1=X1-10:SPRITE1,(X1,Y1-8),56,6:XX=X-X1:IFS>8THEN1410
1370 IFS=0THEN1400
1380 IFXX<=5ANDXX>=-7THENSOUND4,2,15:X8=X8-6:GOSUB3380
1390 GOTO1410
1400 IFXX>=-29ANDXX<=-18THENSOUND4,2,15:X8=X8-6:GOSUB3380
1410 FORI=1TO20:NEXT:SOUND0:S1=0:IFS=28THENS=4
1420 GOTO170
1430 REM
1440 REM SNAP KICK HEAD (BLACK,RIGHT)
1450 REM
1460 IFS>8THEN1610
1470 IFS=0THENX=X+16
1480 SPRITE0,(X,Y),20,1
1490 IFSTICK(2)=5THENS1=S1+40:IFS1>44THENS1=S1-40
1500 IFSTICK(2)=3ANDS1=0THENS1=24
1510 SOUND4,0,10:SPRITE1,(X1,Y1),S1,6:SPRITE0,(X,Y),12,1:XX=X-X1:IFS1>8THEN1560
1520 IFS1=0THEN1550
1530 IFXX<=-18ANDXX>=-26THENSOUND4,2,15:X6=X6-2:GOSUB3360
1540 GOTO1560
1550 IFXX<=3ANDXX>=-4THENSOUND4,2,15:X6=X6-2:GOSUB3360
1560 SOUND0:SPRITE0,(X,Y),20,1:S=4:IFS1=24THENS1=0
1570 GOTO200
1580 REM
1590 REM  LOW KICK  (BLACK,RIGHT)
1600 REM
1610 IFS=40THENX=X+16
1620 SOUND4,0,10:SPRITE0,(X,Y),52,1:XX=X-X1:IFS1=0ORS1=40THEN1650
1630 IFXX<=-14ANDXX>=-29THENSOUND4,2,15:X6=X6-1:GOSUB3360
1640 GOTO1660
1650 IFXX>=-14ANDXX<=1THENSOUND4,2,15:X6=X6-1:GOSUB3360
1660 SOUND0:S=44:GOTO200
1670 REM
1680 REM JUMPING SIDE KICK BLACK,RIGHT1532 REM
1690 IFSTICK(2)=5THENS1=S1+40:IFS1>44THENS1=S1-40
1700 IFSTICK(2)=3THENS1=24
1710 SPRITE1,,S1,6
1720 SOUND4,0,10:X=X+10:SPRITE0,(X,Y-8),60,1:XX=X-X1:IFS1>8THEN1770
1730 IFS1=0THEN1760
1740 IFXX>=-29ANDXX<=-18THENSOUND4,2,15:X6=X6-6:GOSUB3360
1750 GOTO1770
1760 IFXX>=-8ANDXX<=4THENSOUND4,2,15:X6=X6-6:GOSUB3360
1770 FORI=1TO20:NEXT:SOUND0:S=4:IFS1=24THENS1=0
1780 GOTO200
1790 REM
1800 REM JUMPING SIDE KICK RED,RIGHT
1810 REM
1820 IFSTICK(1)=5THENS=S+40:IFS>44THENS=S-40
1830 IFSTICK(1)=3ANDS=0THENS=24
1840 SPRITE0,,S,1
1850 SOUND4,0,10:X1=X1+10:SPRITE1,(X1,Y1-8),60,4:XX=X-X1:IFS>8THEN1900
1860 IFS=0THEN1890
1870 IFXX<=29ANDXX>=18THENSOUND4,2,15:X8=X8-6:GOSUB3380
1880 GOTO1900
1890 IFXX<=8ANDXX>=-4THENSOUND4,2,15:X8=X8-6:GOSUB3380
1900 FORI=1TO20:NEXT:SOUND0:S1=4:IFS=24THENS=0
1910 GOTO170
1920 REM         SOMERSAULT   (BLACK)
1930 REM
1940 U=79:Y3=0:X3=0:X2=X-10:DI=4:IFS=0THENDI=-4:U=63:X2=X+10
1950 POSITION(X2,Y),0,0
1960 FORI=-180TO0STEP12
1970 Y3=SIN(RAD(I))*30
1980 X3=X3+DI:U=U+1
```

```
1990 SPRITE0,(X3,Y3),U,1
2000 NEXT:POSITION(0,0),0,0:X=X+DI*15:GOTO200
2010 REM   SOMERSAULT  (RED)
2020 RE.1
2030 U1=79:Y5=0:X5=0:X4=X1-10:DI=4:IFS1=0THENDI=-4:U1=63:X4=X1+10
2040 POSITION(X4,Y1),0,0
2050 FORI=-180TO0STEP12
2060 Y5=SIN(RAD(I))*30
2070 X5=X5+DI:U1=U1+1
2080 SPRITE1,(X5,Y5),U1,6
2090 NEXT:POSITION(0,0),0,0:X1=X1+DI*15:GOTO170
2100 REM  SPINNING KICK (BLACK,LEFT)
2110 REM
2120 X=X-4:IFS=40RS=44THENX=X-16
2130 XX=X-X1:IFXX<-18THEN2300
2140 FORQ=0TO1:FORW=100T0104STEP4
2150 IFSTICK(2)=5THENS1=S1+40:IFS1>44THENS1=S1-40
2160 IFSTICK(2)=7ANDS1=4THENS1=28
2170 SPRITE1,,S1,6
2180 SPRITE0,(X,Y),W,1:NEXTW,Q
2190 SPRITE0,,108:SPRITE3,(X-16,Y),112,1:SOUND4,0,10:IFS1>8THEN2240
2200 IFS1=0THEN2230
2210 IFXX<=14ANDXX>=4THENSOUND4,2,15:X6=X6-5:GOSUB3360
2220 GOTO2240
2230 IFXX<=36ANDXX>=25THENSOUND4,2,15:X6=X6-5:GOSUB3360
2240 FORT=1TO40:NEXT:SOUND0:SPRITE3,,,0:IFS=40RS=44THENX=X+16
2250 IFS1=28THENS1=4
2260 GOTO200
2270 REM
2280 REM SPINNING KICK (BLACK,RIGHT)
2290 REM
2300 X=X+12
2310 XX=X-X1
2320 FORE=0TO1:FORR=120T0124STEP4
2330 IFSTICK(2)=3THENS1=S1+40:IFS1>44THENS1=S1-40
2340 IFSTICK(2)=3ANDS1=0THENS1=24
2350 SPRITE1,,S1,6
2360 SPRITE0,(X,Y),R,1:NEXTR,E
2370 SPRITE0,(X+8,Y),128:SPRITE3,(X+40,Y),132,1:SOUND4,0,10:IFS1>8THEN2420
2380 IFS1=0THEN2410
2390 IFXX>=-45ANDXX<=-32THENSOUND4,2,15:X6=X6-5:GOSUB3360
2400 GOTO2420
2410 IFXX>=-21ANDXX<=-10THENSOUND4,2,15:X6=X6-5:GOSUB3360
2420 FORT=1TO40:NEXT:SOUND0:SPRITE3,,,0:IFS=40RS=44THENX=X+16
2430 IFS1=24THENS1=0
2440 GOTO200
2450 REM
2460 REM SPINNING KICK (RED,LEFT)
2470 REM
2480 X1=X1-4:IFS1=4THENX1=X1-16
2490 XX=X-X1:IFXX>0THEN2660
2500 FORQ=0TO1:FORW=100T0104STEP4
2510 IFSTICK(1)=5THENS=S+40:IFS>44THENS=S-40
2520 IFSTICK(1)=7ANDS=4THENS=28
2530 SPRITE1,(X1,Y1),W,6
2540 SPRITE0,,S,1:NEXTW,Q
2550 SPRITE1,,108:SPRITE3,(X1-16,Y1),112,6:SOUND4,0,10:IFS>8THEN2600
2560 IFS=0THEN2590
2570 IFXX>=-14ANDXX<=-4THENSOUND4,2,15:X8=X8-5:GOSUB3380
2580 GOTO2600
2590 IFXX>=-36ANDXX<=-25THENSOUND4,2,15:X8=X8-5:GOSUB3380
2600 FORT=1TO40:NEXT:SOUND0:SPRITE3,,,0:IFS1=4THENX1=X1+16
2610 IFS=28THENS=4
2620 GOTO170
2630 REM
2640 REM SPINNING KICK (RED,RIGHT)
2650 REM
2660 X1=X1+12
2670 XX=X-X1
2680 FORE=0TO1:FORR=120T0124STEP4
2690 IFSTICK(1)=5THENS=S+40:IFS>44THENS=S-40
2700 IFSTICK(1)=3ANDS=0THENS=24
```

```
2710 SPRITE0,(X,Y),S,1
2720 SPRITE1,(X1,Y1),R,6:NEXTR,E
2730 SPRITE1,(X1+8,Y1),128:SPRITE3,(X1+40,Y1),132,6:SOUND4,0,10:IFS>8THEN2780
2740 IFS=0THEN2770
2750 IFXX<=45ANDXX>=32THENSOUND4,2,15:X8=X8-5:GOSUB3380
2760 GOTO2780
2770 IFXX<=21ANDXX>=10THENSOUND4,2,15:X8=X8-5:GOSUB3380
2780 FORT=1TO40:NEXT:SOUND0:SPRITE3,,,0:IFS1=4THENX1=X1+16
2790 IFS=24THENS=0
2800 GOTO170
2810 REM
2820 REM   PICTURE LAYOUT
2830 REM
2840 SCREEN2,1:CLS:COLOR1,15,(0,0)-(255,191),4:B=192:T=0
2850 FORV=1TO10:T=T+8:A=A+5:B=B+5:FORI=ATOBSTEP11:CURSORI,T:COLOR1:PRINTCHR$(20E
):CURSORI,T:COLORRND(1)*4+8:PRINTCHR$(209):NEXTI,V
2860 COLOR1,7,(55,90)-(248,110)
2870 LINE(0,10)-(48,90),1
2880 LINE(10,28)-(10,92),1
2890 LINE(22,48)-(22,95),1
2900 LINE(35,71)-(35,102),1
2910 LINE(0,85)-(50,110),3
2920 LINE(200,3)-(255,90),1
2930 LINE(0,3)-(200,3),1
2940 LINE(48,90)-(255,125),1,B
2950 LINE(0,110)-(255,111),1,B
2960 LINE(151,110)-(151,125),1
2970 CIRCLE(65,117),3,15,,,,BF
2980 CIRCLE(80,117),3,15,,,,BF
2990 CIRCLE(95,117),3,15,,,,BF
3000 CIRCLE(161,117),3,15,,,,BF
3010 CIRCLE(176,117),3,15,,,,BF
3020 CIRCLE(191,117),3,15,,,,BF
3030 PAINT(10,100),3
3040 PAINT(250,0),4
3050 COLOR1,3,(0,125)-(255,191)
3060 COLOR1,14,(50,110)-(255,124)
3070 COLOR1,3,(0,110)-(46,191)
3080 LINE(6,140)-(43,147),1,BF
3090 LINE(6,170)-(43,177),6,BF
3100 LINE(151,127)-(55,191),14
3110 LINE(151,127)-(255,191),14
3120 PAINT(60,191),14
3130 CURSOR2,130:COLOR1:PRINT"STAMINA"
3140 CURSOR2,160:COLOR6:PRINT"STAMINA"
3150 LINE(48,110)-(48,191),1
3160 CURSOR107,114:COLOR6:PRINT"POINTS"
3170 CURSOR205,114:COLOR1:PRINT"POINTS"
3180 CURSOR75,97:COLOR1:PRINTCHR$(17);"KARATE CHAMPS";CHR$(16)
3190 M=122:A=5:FORI=1TO8:M=M+A:A=A+1:BLINE(60,M)-(255,M):NEXTI
3200 COLOR1,15,(232,130)-(237,135)
3210 CURSOR225,130:PRINTCHR$(210)
3220 CURSOR225,138:PRINTCHR$(211)
3230 CURSOR233,130:PRINTCHR$(212)
3240 CURSOR233,138:PRINTCHR$(213)
3250 COLOR1,15,(73,130)-(79,135)
3260 CURSOR70,130:PRINTCHR$(214)
3270 CURSOR70,138:PRINTCHR$(215)
3280 CURSOR78,130:PRINTCHR$(216)
3290 CURSOR78,138:PRINTCHR$(217)
3300 BLINE(100,127)-(200,146),,BF
3310 COLOR1,11,(135,137)-(170,145)
3320 LINE(135,145)-(168,145),3
3330 CURSOR138,128:COLOR1:PRINTCHR$(208);SPC(2);CHR$(208)
3340 CURSOR138,128:COLOR8:PRINTCHR$(209);SPC(2);CHR$(209)
3350 RETURN
```

```
3360 BLINE(X6,170)-(X7,177),,BF:X7=X6:IFX6<7THEN3420
3370 RETURN
3380 BLINE(X8,140)-(X9,147),,BF:X9=X8:IFX8<7THEN3560
3390 RETURN
3400 REM    WINNING OF A POINT  BLACK
3410 REM
3420 SOUND0:SPRITE1,(X1-10,Y1+20),32,6
3430 SPRITE3,,,0
3440 K1=K1+15:CIRCLE(K1,117),3,1,,,,BF
3450 F=9:Y=142
3460 L=X1+15:IFX<X1-10THENL=X1-45
3470 FORI=1TO20
3480 F=F*-1:BEEP
3490 SPRITE0,(L,Y+F),36,1:SOUND0:NEXT
3500 LINE(6,170)-(43,177),6,BF
3510 LINE(6,140)-(43,147),1,BF
3520 IFK1=191THENC$="BLACK":C1$="RED":GOTO3680
3530 GOTO90
3540 REM     WINNING OF A POINT  RED
3550 REM
3560 SOUND0:SPRITE0,(X,Y+20),32,1
3570 SPRITE3,,,0
3580 K=K+15:CIRCLE(K,117),3,6,,,,BF
3590 F1=9:Y1=142
3600 L=X+15:IFX>X1-8THENL=X-35
3610 FORI=1TO20
3620 F1=F1*-1:BEEP
3630 SPRITE1,(L,Y1+F1),36,6:NEXT
3640 LINE(6,140)-(43,147),1,BF
3650 LINE(6,170)-(43,177),6,BF
3660 IFK=95THENC$="RED":C1$="BLACK":GOTO3680
3670 GOTO90
3680 SCREEN1,1:CLS:COLOR15,4
3690 CURSOR5,15:PRINT"DO YOU WANT REVENGE ";C1$;"?"
3700 CURSOR10,10:PRINT"WINNER = ";C$
3710 FORI=1TO20
3720 IFINKEY$="Y"THEN3820
3730 IFINKEY$="N"THEN10
3740 NEXT
3750 CURSOR10,10:PRINT"
3760 FOR I=1TO20
3770 IFINKEY$="Y"THEN3820
3780 IFINKEY$="N"THEN10
3790 NEXT
3800 GOTO3700
3810 CLS:END
3820 GOSUB8000
3830 GOTO50
7000 GOTO9920
7001 SCREEN2,1:CLS:COLOR15,1,(0,0)-(255,191),4:RESTORE:COLOR4
7010 CURSOR70,2:PRINTCHR$(17);"WELCOME TO";CHR$(16)
7020 CURSOR40,95:COLOR7:PRINT"THIS GAME IS FOR 2 PLAYERS ONLY"
7030 CURSOR65,107:COLOR3:PRINT"JOYSTICKS MUST BE USED"
7040 FORI=0TO16
7050 READT,T1,T2,T3:LINE(T,T1-20)-(T2,T3-20),15,BF
7060 NEXT
7070 FORI=0TO18
7080 READT4,T5,T6,T7:LINE(T4,T5-20)-(T6,T7-20),15
7090 NEXT
7100 FORI=0TO6
7110 READT8,T9:PAINT(T8,T9-20),15
7120 NEXT
7130 LINE(15,82)-(250,90),14,BF
7140 LINE(15,14)-(250,22),14,BF
7150 BLINE(15,85)-(250,87),,BF
7160 BLINE(15,17)-(250,19),,BF
7161 MAG3:SPRITE0,(80,132),8,15
7163 SPRITE1,(40,132),128,15
7164 SPRITE3,(142,132),52,15
7165 SPRITE4,(160,110),56,15
7166 CURSOR72,133:COLOR15:PRINTCHR$(218)
7170 SCREEN2,2:COLOR15
```

```
7180 COLOR10:CURSOR100,180:PRINT"PRESS FIRE"
7190 FORK=1TO100000
7200 FORI=1TO15
7210 COLOR1,6,,I
7220 IFSTRIG(1)ORSTRIG(2)>OTHEN8000
7230 NEXTI,K
7240 DATA 20,50,27,92,62,64,69,92,69,71,83,78,83,64,90,92,104,50,111,92,111,50,1
25,57,111,71,125,78,125,57,132,71
7250 DATA 146,64,153,92,153,71,167,78,167,64,174,92,180,50,215,57,194,57,201,92,
224,50,250,57,224,57,232,92,232,85,250,92,232,67,242,74,27,71,48,50,27,78,55,50,
31,75,48,92,34,71,55,92,48,50,55,50,48,92,55,92,62,64,76,50,69,64,76,57,76,57,83
,64,76,50,90,64
7260 DATA 118,78,125,92,125,78,132,92,125,50,132,57,125,78,132,71,125,92,132,92,
146,64,160,50,153,64,160,57,160,57,167,64,160,50,174,64,49,51,49,91,76,53,119,79
,130,72,129,56,160,53
8000 SCREEN1,1:CLS:COLOR15,4
8010 T$="Do you want instructions (Y/N)"
8020 FORI=1TOLEN(T$):SOUND1,700,15:T1$=MID$(T$,I,1)
8030 IFT1$=" "THENSOUNDO:NEXT
8040 CURSORI+2,6:PRINTT1$
8050 SOUNDO:NEXT
8060 IFINKEY$="Y"THEN8090
8070 IFINKEY$="N"THEN8160
8080 GOTO8060
8090 CLS:PRINTTAB(10);"INSTRUCTIONS"
8100 PRINTTAB(10);""
8110 CURSORO,2:PRINT"SNAP KICK : PUSH FIRE 1 TO KICK TO THELEFT AND FIRE 2 TO KI
CK TO THE RIGHT."
8120 CURSORO,5:PRINT"LOW KICK : FIPST YOU MUST BE BOBBING  DOWN (PUSH JOYSTICK D
OWN) THEN PUSH   FIRE 1 TO KICK TO THE LEFT AND FIRE 2 TO KICK TO THE RIGHT."
8130 CURSORO,10:PRINT"JUMPING SIDE KICK : FIRST YOU MUST BE JUMPING (PUSH JOYSTI
CK UP) THEN PUSH  FIRE 1 TO KICK TO THE LEFT AND FIRE 2 TO KICK TO THE RIGHT."
8140 CURSORO,15:PRINT"BACK SPINNING KICK : PUSH  FIRE 1 AND FIRE 2 TOGETHER TO K
ICK (REGARDLESS OFYOUR DIRECTION)."
8150 CURSORO,19:PRINT"SOMERSAULT : FIRST YOU MUST BE JUMPING(PUSH JOYSTICK UP) T
HEN PUSH FIRE 1   AND FIRE 2 TOGETHER TO SOMERSAULT IN  THE DIRECTION THAT YOU W
ERE FACING.":GOTO2840
8160 BEEP:CURSOR6,15:PRINT"Please wait for 30 secs":GOTO2840
9000 DATA2,"0E0E04066F3F0F1E"
9010 DATA3,"0E1E3E36376363E6"
9020 DATA4,"70702060F6FCF078"
9030 DATA5,"70787C6CEEC6C663"
9040 DATA8,"0060301C0E070300"
9050 DATA10,"1C1C084C3EBEFCF8"
9060 DATA11,"703030181818180C"
9070 DATA12,"383810327C7D3F1F"
9080 DATA13,"0E0C0C1818181830"
9090 DATA14,"00060C3870E0C000"
9100 DATA16,"0000000000000001"
9110 DATA17,"030301010001"
9120 DATA18,"1C1C084C3E3E3CF8"
9130 DATA19,"F0F03098989818 0C"
9140 DATA20,"383810327C7C3C1F"
9150 DATA21,"0F0F0C1919191830"
9160 DATA22,"0000000000000080"
9170 DATA23,"C0C080800080"
9180 DATA26,"0E6E44464F3F0F0E"
9190 DATA27,"0E1E3E36376363E6"
9200 DATA28,"70762262F2FCF070"
9210 DATA29,"70787C6CEEC6C663"
9220 DATA32,"000000DFFFDF1400"
9230 DATA34,"00000080FCFE6200"
9240 DATA38,"5D5D493E3E1C1C1C"
9250 DATA39,"1C3E3E3636363663"
9260 DATA41,"0000000001030307"
9270 DATA42,"0000000000001C1C"
9280 DATA43,"08BEFF3EFFFF060C"
9290 DATA44,"0000000000003838"
9300 DATA45,"107DFF7CFFFF6030"
9310 DATA47,"0000000080C0C0E0"
9320 DATA49,"00000000010F3FE0"
9330 DATA50,"0000000000001C1C"
9340 DATA51,"08BEFF3EFFFF060C"
9350 DATA52,"0000000000003838"
9360 DATA53,"107DFF7CFFFF6030"
9370 DATA55,"0000000080F0FC07"
9380 DATA57,"000000001F7FF0"
9390 DATA58,"0000000000001C1C"
9400 DATA59,"08BEFF3EFFFF060C"
9410 DATA60,"0000000000003838"
9420 DATA61,"107DFF7CFFFF6030"
9430 DATA63,"00000000F8FE0F00"
9440 DATA64,"0000000F6F7F6F0C"
9450 DATA65,"1414250903"
9460 DATA66,"000000C0E0F0F030"
9470 DATA67,"70E0C080"
9480 DATA68,"0000000070F1E1E"
9490 DATA69,"1E1E1F1F040E0E00"
9500 DATA70,"0000000080C0E070"
9510 DATA71,"3808E010C0200000"
9520 DATA72,"0000000010307 0E"
9530 DATA73,"0C0F0F0703"
9540 DATA74,"000000C090A42828"
9550 DATA75,"30F6FEF6F0"
9560 DATA76,"0000040308071 01C"
9570 DATA77,"0E070301"
9580 DATA78,"00707020F8F87878"
9590 DATA79,"7878F0E0"
9600 DATA80,"00000003070F0F0C"
9610 DATA81,"0E070301"
9620 DATA82,"000000F0F6FEF630"
9630 DATA83,"2828A490C0"
9640 DATA84,"0000000010307 0E"
9650 DATA85,"1C1007080304"
9660 DATA86,"00000000E0F07878"
9670 DATA87,"7878F8F820707000"
```


continued on p. 31

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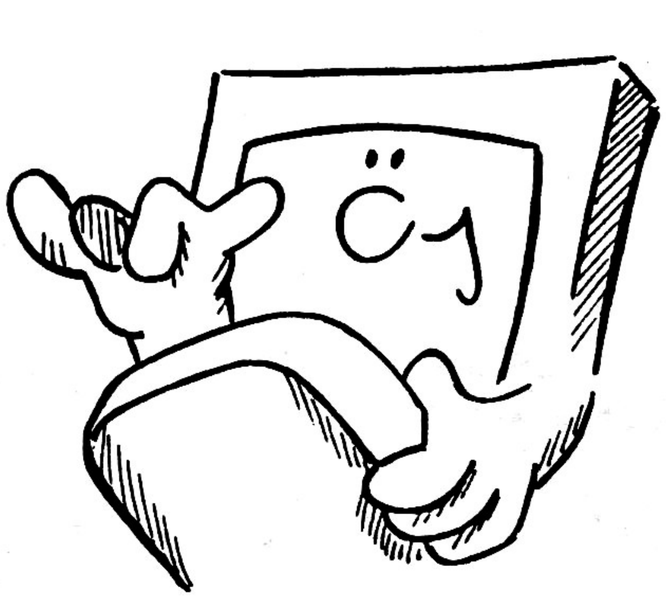
BASE PATCH ... by TREVOR YANN

```
10 CLS:E=0
20 PRINT"       SEGA BASE PATCH PROGRAM":PRINT
25 PRINT"            by Trevor Yann"
27 PRINT
30 PRINT"This program will alter a disk"
40 PRINT"containing the Sega Base program so"
50 PRINT"that any printer can be connected to"
60 PRINT"the centronics printer port."
70 PRINT:PRINT
80 PRINT"Insert Sega Base system disk and"
90 PRINT"press <CR>."
100 T$="*":C=10
110 A$=INKEY$
120 IFA$=CHR$(13)THEN170
130 IFE=1THENIFA$<>""THENPRINTCHR$(8):END
140 C=C+1:IFC<5THEN110
150 PRINTT$;:C=0:IFT$="*"THENT$=CHR$(8):GOTO110
160 T$="*":GOTO110
170 PRINTCHR$(8);:BEEP
180 TR=0:SC=1
190 DSKI$ TR,SC;A$(0),0,128;A$(1),128,128
200 IFLEFT$(A$(0),14)<>"SYS: SEGA BASE"THENBEEP2:PRINT:PRINT"This is not a Sega
Base system disk.":PRINT:GOTO80
210 PRINT:PRINT"Updating disk"
220 TR=0:SC=10
230 DSKI$ TR,SC;A$(0),0,128;A$(1),128,128
240 BT=&HBB
250 NW$=CHR$(&H0D)+CHR$(&H28)+CHR$(&H05)+CHR$(&HFE)+CHR$(&H0A)+CHR$(&HC2)+CHR$(&
HD3)+CHR$(&H09)+CHR$(&H3E)+CHR$(&H0A)
260 NW$=NW$+CHR$(&HCD)+CHR$(&HE5)+CHR$(&H09)+CHR$(&H3E)+CHR$(&H0D)+CHR$(&HCD)+CH
R$(&HE5)+CHR$(&H09)+CHR$(&HC3)+CHR$(&HF3)+CHR$(&H09)
270 LN=LEN(NW$)
280 A$(INT(BT/128))=LEFT$(A$(INT(BT/128)),BTMOD128)+NW$+RIGHT$(A$(INT(BT/128)),1
28-BTMOD128-LN)
290 DSKO$ TR,SC;A$(0),0,128;A$(1),128,128
300 BEEP:E=1
310 PRINT"Disk updated":PRINT
320 PRINT"Press <cr> to update another disk,"
330 PRINT"or any other key to end the program."
340 GOTO100
```

YOUNG'NS HINT SHEET



LOOK	INSERT	Use these words in conjunction with words used in the adventure. To start you off try getting up on the bunk and examining it. The space suit could be of benefit. From there on it's up to you!
I (Inventory)	EAT	
GO	READ	
GET	SAY	
EXAM	CLIMB	
WEAR	THROW	
PUSH	MAKE	
HOLD	COOK	
PULL	BUY	
OPEN	LIGHT	GOOD LUCK!!!!
TAPE	RUB	
FIX	HELP	
BREAK	SHOOT	
CUT	UNLIGHT	

• For some time now rumours have been about that Sega (Japan) have been setting up shop in Australia after the collapse of the John Sands Sega operation. Australian and New Zealand Sega owners felt that at last they were going to get some support from the company itself. They were going to bring out new computers and new games galore ... now we have just heard that Sega are moving out again. They blame it on the strength of the Yen and the downturn in the Australian economy which makes their products more difficult to sell.

However, they have released several 'new' cartridge games (including Flicky!!) reported to be selling at $AUS 39.95 ($NZ 49.95). What will happen from now is anybody's guess but Australians in particular are feeling a bit low now that there is no major company supporting the Sega in Australia.

• Here in New Zealand we seem to have revived the spirits of many Sega owners with our direct marketing and enthusiastic support for Sega. Many new products will appear in our catalogue.

• Sega Control Stations (ie. disk drive units) are still in short supply but we are still able to source supplies for members... however, stocks are definitely low!

• 3 inch disks for disk drives are in world wide shortage due to the popularity of Amstrad and Sega. If you see any at your local shop 'grap them quick' as prices are rising fast! This is the reason that disk based software such as Aerobat are taking so long to come through.

• Australians are taking a big interest in our User Club with the magazine now being posted to over 500 Sega enthusiasts in Australia.

• The Sega computer has been sold in significant numbers to countries as diverse as the USA, Iceland, Switzerland and Italy. One attraction is that the keyboard is 'multilingual' and the cartridge games are available for immediate satisfaction. We are definitely interested in any overseas Sega contacts you may have.

• One ongoing problem that all cassette tape software has is that it can be erratic in loading. This has always been a problem and comes from a mismatch between the recording on one data recorder and the reading from another. Tape quality is a problem also. All the suppliers of software do their best to provide good quality tape and recording but... gremlins can get into the works.
If you have problems loading a commercial tape purchased from us then simply send the tape back and another will be forwarded.

• Sega computer groups are springing up all over the country and even being revived. They are excellent value for all beginners (and even further on) and provide good, enthusiastic ongoing support for the computer.
See our list at the back of the magazine for your local club or even put your name forward for your area. There is no doubt that working together helps all.

• We are working hard to try and get some of the more complex machine code games onto disk. In forthcoming magazines we will advise you of new releases.

• The new Sega joystick, although small, is rugged and reliable and has found favour amongst our members... so we have heard.

• We at Sega Software Support have been inundated with letters and enquiries since the last magazine and catalogue. We are working our way steadily through these so if your enquiry is a little delayed it isn't because you have been ignored - it is because we are working our way to the bottom of the heap.

• The GREAT SEGA IS SUPREME Competition is outlined elsewhere in the magazine. Take advantage of it NOW.

The Survey Form MUST be returned AND you MUST be a member to be eligible for the GRAND PRIZE DRAW.

Note that membership also entitles you other discounts as well - in fact, two membership offers are available this issue.

SEGA SPEECH PROCESSOR

by PETER BIGGS

This is one of the more interesting add-ons for the Sega. Although expensive it offers a huge range of additional functions your computer can perform and 'stun and amaze' the family.

The Speech Processor comes in a sleek black plastic box which includes a speaker, a volume control, a Centronics (large) port (for an 80 column printer), a stereo output, an external 8 Ohm speaker output and two switches for on/off and standby. The unit is powered directly from the mains.

The ribbon cable plugs into the Centronics port of the SF-7000 Control Station. An interesting feature is that an 80 column printer can then be run from the speech processor and the peripheral not needed can be switched off.

A small program in the documentation needs to be typed in to get the feel of the speech processor.

The speech system works by means of "allophones" or parts of speech. These allow a user to join these together to make words or phrases. 59 speech allophones and 5 pauses are available.

The sound is obtained by 'printing' to the Centronics port with LPRINT CHR$(xx) where xx is an ASCII code.

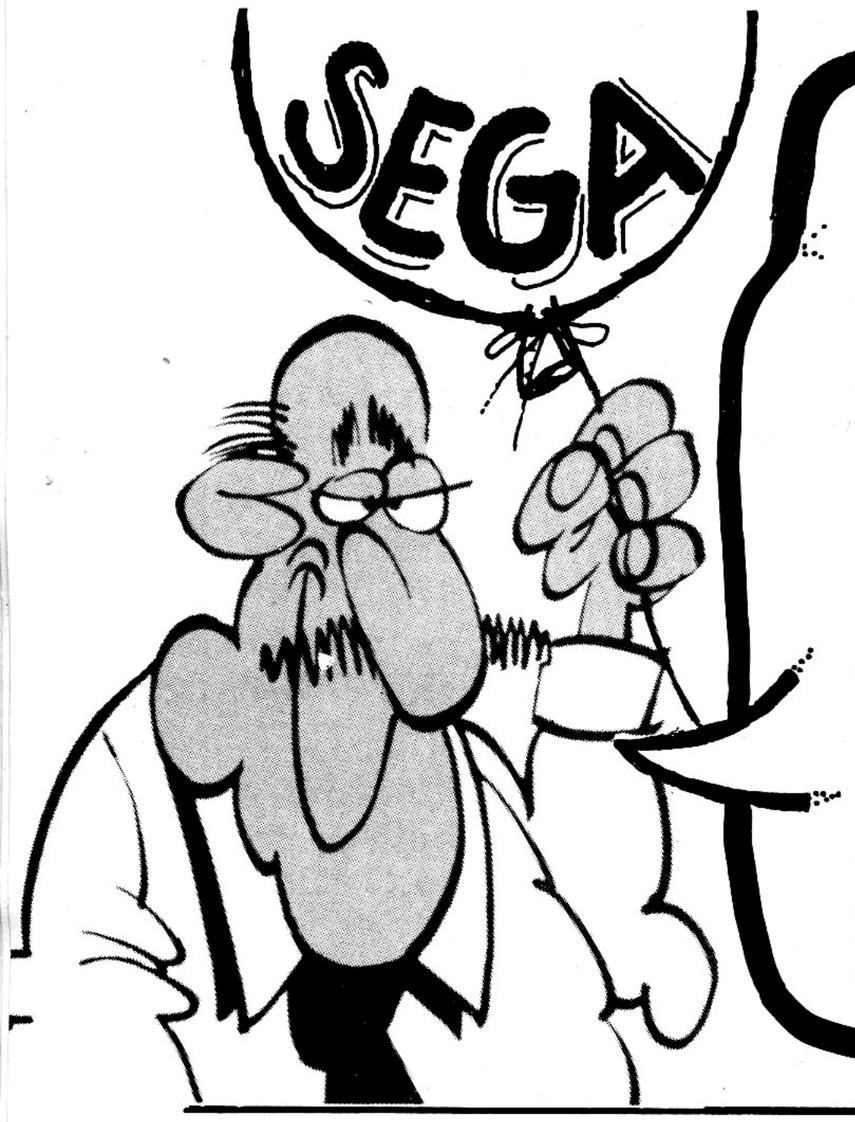
One immediate use is that it could be used to speak instructions while a menu is being displayed or used in conjunction with a game.

I found it easy to use, especially with the small program. Constructing words became easy once I got the idea that words are sounds and I virtually ignored the spelling.

The speech is 'robotic' sounding like a Dalek - in fact my favourite word is Exterminate!

User Tronic Developments have produced a solid product that is very useful for the Sega.

The Speech Processor is available through Sega Software Support at $235



A Word on Club Membership ...

If you have a Sega computer and you don't have Club Membership then you are missing out on many offers such as the above. Every Club member has the opportunity to gain more than their membership fee in savings throughout the year. We guarantee this!
The Sega Computer magazine, which is **FREE** with Club Membership, keeps you in touch with the latest news of products - both software and hardware - and useful reviews, articles and programs. Our Club members tell us that it's definitely worth the extra!

The Sega User Club Membership until September 30 1986 is $40.09 (incl. $3.09 GST). Membership subscriptions received on or after October 1 1986 will be $40.70 (incl. $3.70 GST).

EXTRA
For 1986-87 we offer a **FREE** copy of **COMPUTERS DON'T BYTE** with every Club Subscription

FACE .. by Aaron Boulton

This little program simply draws a face on the screen - but it certainly is an interesting face!

```
10 REM FACE
20 REM
30 REM
40 REM This Program Draws A Face on the Screen. That's all... But it's
50 REM A Face worth seeing!
60 REM ----------------------------
70 REM
80 SCREEN2,1:COLOR,1,,1:CLS
90 FORX=1TO45:READ A,B,C:LINE(A,B)-(C,B),15:NEXT
100 DATA100,101,102,100,102,104,101,103,104,108,103,114,100,104,115,99,105,116,9
9,106,117,97,107,117,97,108,116,98,109,100
110 DATA103,109,107,104,110,106,111,110,112,105,111,106,105,112,106,109,112,110,
115,112,118,99,113,102,104,113,106,109,113,111,113,113,117
120 DATA98,114,106,108,114,117,97,115,117,97,116,117,98,117,117,98,118,116,98,11
9,106,109,119,116,99,120,104,109,120,116
130 DATA99,121,104,110,121,115,99,122,105,108,122,116,99,123,105,112,123,116,100
,124,107,109,124,115,100,125,105,109,125,114,102,126,112,103,127,112,104,128,110
,105,129,109
140 PSET(100,100),15:PSET(110,102),15:PSET(100,112),15:PRESET(103,123),15
150 SCREEN2,2
160 GOTO160
```

TO QUALIFY FOR ENTRY TO THE 'SEGA IS SUPREME' COMPETITION ALL YOU NEED TO DO IS

* Be registered as a member of the Sega User Club before October 10

* Return your **SEGA SURVEY SHEET** completed.

Your membership number is your ticket in the draw for these great prizes.

NOTE: All prizes drawn under Police Supervision on October 15 1986.

All prizewinners will be contacted after this date and the results published in the next issue.

SEGA
IS
SUPREME
Competition
Enter the Great
SEGA IS SUPREME
Competition and be in with a chance to win any one of these great prizes ... entry is amazingly easy and very worthwhile ... after all ...

THE PRIZES YOU COULD WIN ARE:

1st

Sega SF7000 Control Station
Valued at $550, this disk drive unit really makes using the Sega a breeze! No longer will you need to bother with cassette tapes. A very useful and comprehensive manual comes with the unit. You'll be delighted with this!

2nd

Sega Printer Plotter.
Valued at $360, the Printer Plotter will allow you to write letters, print graphs and list your programs for convenient checking. Great value.

3rd

Sega Speech Processor.
Valued at $235, the Speech processor from User Tronics will introduce you to another world ... speech from your computer. Even your friends will be astonished at your good fortune.

4th

Software of your choice from our catalogue to the value of $100.
A chance to expand your software collection ... at no cost!

MEMBERSHIP ONLY OFFER

And even if you don't win one of these prizes we can still offer you a good deal! These are just some of our great value bargains for members.

THESE PRICES ARE VALID ONLY UNTIL SEPTEMBER 29. AFTER THIS DATE ALL PRICES WILL INCREASE BY 10% WITH GST!

A Special MEMBER ONLY offer of 3 games cartridges of your choice from the Sega Software Support Catalogue for $65 (p&h free)

SUPREME SEGA GAMES - We have just received a few!!! of the following outstanding Sega games cartridges:

ORGUSS FLICKY
CHAMPIONSHIP BOXING

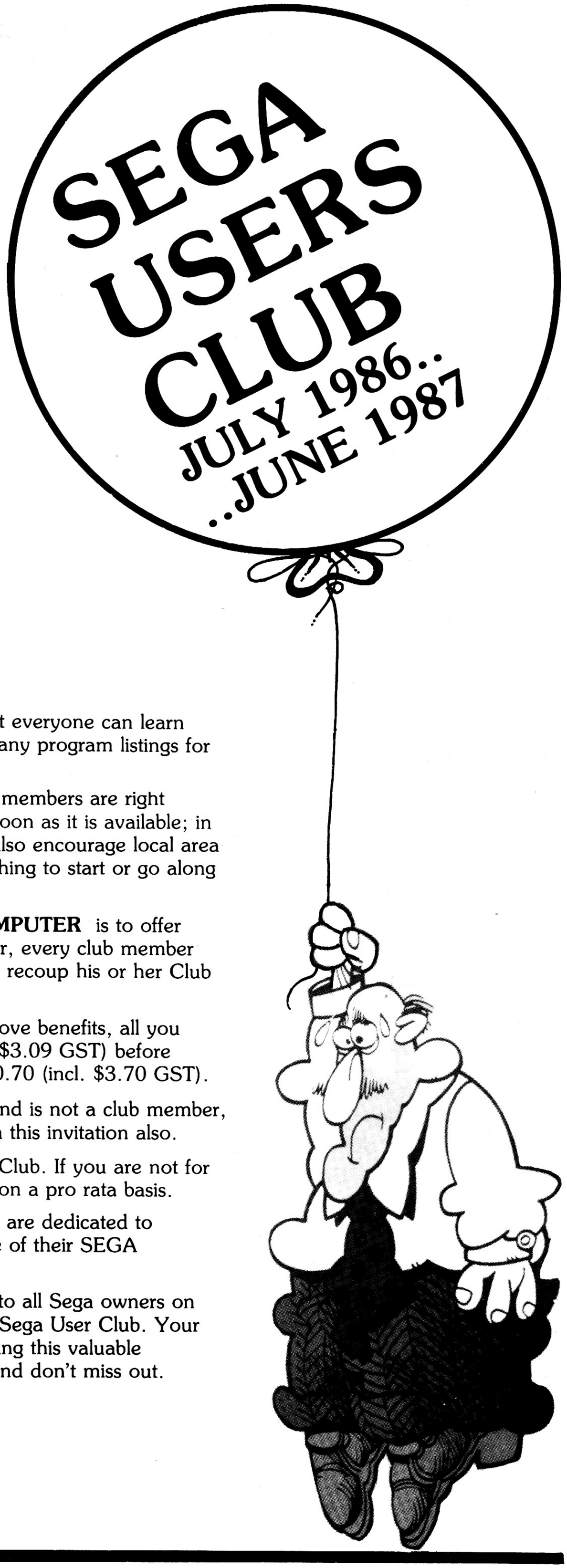
These are all quite quite superb and cost $30 each (incl. p&h). These will be available to MEMBERS ONLY - ONE PER MEMBER - in order of receipt of your Sega Survey Sheet. Please indicate your order of preference on the SEGA SURVEY SHEET as the cartridge you want may be sold out.

IMPORTANT NOTE: THIS OFFER IS GOOD ONLY WHILE STOCKS LAST! ACT NOW... AS THESE CARTRIDGES WILL NEVER BE AVAILABLE AGAIN.

If stocks are exhausted we will return your money IN FULL.

Dear Sega User..

We are pleased to offer you an invitation to join our **SEGA USERS CLUB**. Membership of this club provides many exclusive benefits throughout the year including the bi-monthly **SEGA COMPUTER** magazine, crammed full of useful information for beginners and advanced programmers. The six issues will build up throughout the year to become a fully comprehensive manual, which will enable absolute beginners to programming to learn step-by-step how to operate the computer, and its software, with clear explanations issue by issue of all the programming commands and statements. Contributors like Mike Howard and others continue to make the magazine the first source of good information about Sega.



Advanced programmers will benefit from information about programming in machine code as they discover that working with **SEGA's** remarkable Sprite and Sound capabilities is well within their grasp.

Letters are published and questions answered in order that everyone can learn from each other's discoveries and problems, with many many program listings for games and utility programs to type in yourself.

New hardware and software releases are reviewed so that members are right up-to-date on what is available; how it works and just as soon as it is available; in order that you can make full use of your computer. We also encourage local area meetings by publishing dates and meetings for anyone wishing to start or go along to a local User Group.

A regular feature of the User Club's magazine **SEGA COMPUTER** is to offer selected software titles at discount prices. Through the year, every club member who takes advantage of these special offers will more than recoup his or her Club subscription fee.

If you would like to become a member and receive the above benefits, all you need to do is send us your payment for $40.09 (includes $3.09 GST) before September 30 1986. After this date the subscription is $40.70 (incl. $3.70 GST).

Also, if you know someone who has a SEGA computer and is not a club member, send us their name and address ... and we will send them this invitation also.

Our guarantee is that you will be 100% satisfied with the Club. If you are not for any reason, we will immediately refund your subscription on a pro rata basis.

We greatly value all our members, both old and new, and are dedicated to ensuring that everyone is capable of making the fullest use of their SEGA computer.

This issue of **SEGA COMPUTER** magazine is being sent to all Sega owners on our mailing list to show you the value of belonging to the Sega User Club. Your Club Subscription will ensure that you will continue receiving this valuable magazine and the benefits of club membership. Act now and don't miss out.

Yours sincerely

Glenys Millington

THIS SHEET IS MY ENTRY FOR "SEGA IS SUPREME" COMPETITION.

SEGA SURVEY SHEET

A survey of Sega owners is being made so that our Sega User Club can more directly be of benefit to YOU.

Returning this sheet, with your Sega User Club subscription or your membership number will ensure your entry in the SEGA IS SUPREME competition.

Please answer every item as it is important for us to know just what you need now and in the future ... so that you won't lose out in your investment in your Sega Computer.

MEMBERSHIP

1. Membership Number (if already a member):

2. How long have you owned a Sega?
   Years Months

3. Have you been a previous member?
   Yes No

4. Were you satisfied? Yes No

5. If not, why not?

.....

.....

.....

.....

What is the youngest and oldest age of members of your family using Sega?

6. Youngest Under
   7 8-12 13-15 16-18 Adult

7. Oldest Under
   7 8-12 13-15 16-18 Adult

8. Are you satisfied with choosing a Sega?
   Yes No

9. If not, why not?

.....

.....

.....

.....

HARDWARE

10. Do you have a Printer/Plotter?
    Yes No

11. Do you intend purchasing one in the next 12 months? Yes No

12. Do you have a Control Station (Disk Drive? Yes No

13. Do you intend purchasing one in the next 12 months? Yes No

14. Is there any hardware that you would like? .....

COMPUTER SOFTWARE

15. How many games cartridges do you have? .....

16. Would you like more? Yes No

17. Do you have the 32K BASIC IIIB Cartridge? Yes No

What sort or software would you like to have for your Sega?

18. Would you like the software to be on:
    TAPE DISK circle your choice(s)

Would you like to have more: (Please tick your choices)

19. SHOOT-'EM-UP Games

20. ADVENTURE Games

21. OTHER Games (Please Specity)

.....

22. Music

23. Utilities

24. Educational

25. Business (Financial)

26. Word Processing

27. Other (Please specify)

.....

PROGRAMMING

28. How would you rate your programming ability in BASIC? (Please circle your choice)

    Nil 0 1 2 3 4 5 6 7 8 9 10 Excellent

29. How would you rate your programming ability in MACHINE CODE? (Please circle your choice)

    Nil 0 1 2 3 4 5 6 7 8 9 10 Excellent

SEGA USER CLUB

What would you like to see in the Magazine? (Please circle your choice)

Articles on:

30. Beginning BASIC More/Same/Less
31. Intermediate BASIC More/Same/Less
32. Hardware More/Same/Less
33. Beginning Machine Code More/Same/Less
34. Other (Please specify)

.....

Reviews of:

35. Software More/Same/Less

Programs:

36. Educational More/Same/Less
37. Games More/Same/Less
38. Utilities More/Same/Less

39. Other (Please specify)

.....

.....

.....

.....

Any other comments would be welcome. Please write these on a separate sheet and attach to this survey. Thank you for your time.

Name:.....

Address:.....

.....

.....

New Sub. Yes No

✱ Subscription: for 1986/87 Subscription Year (Includes a FREE copy of 'Computers Don't Byte'). $40.09
After 30 September $40.70

✱ OFFER 1
Three Games Cartridges
as requested below: $65.00

.....

.....

✱OFFER 2
SUPREME Sega Games Cartridges.
One cartridge per member.
Please indicate your order of preference

☐ FLICKY

☐ ORGUSS

☐ CHAMPIONSHIP BOXING $30.00

TOTAL _____

After Oct 1, add 10% GST
Payment: Cash Cheque Visa Bankcard
(Circle one)

Credit Card Number .....

Expiry Date /

Signed .....

WORD PROCESSING
WITH YOUR SEGA COMPUTER ... by Selwyn Easton

In this article I will attempt to cover the basic requirements for Word Processing with your SEGA computer and review the four Word Processing programs currently available.

WORD PROCESSING

Word Processing basically involves the use of a mico-processor, with its' memory, disk drives, monitor and other associated devices, to create and manipulate text. During the creation of a document the text can be saved on disk or tape and when the user is satisfied with the format of the text it can be printed on paper via the printer port of the computer.
The use of high density disks means that many hundreds or thousands of pages of information and correspondence can be stored in a single small package.
The basic requirements for Word Processing with your Sega are:

1. Your SC-3000 or 3000H
2. A Data Recorder or
   SF-7000 Super Control Station.
3. A Printer.
4. A Word Processing Program.

The SC-3000H is more desirable because of its' typewriter like keyboard but if you are not a fast typist then the SC-3000 will suffice.

An SF-7000 Super Control Station is also desirable because of its' speed in saving and loading documents. It also has a dedicated centronics printer port which means a centronics printer can be used without the use of an interface device as is required with just the SC-3000. Of course, the SP-400 printer can be used in either case.

The choice of your printer will ultimately dictate the quality of your finished text and for more serious uses an 80 column centronics printer with Near Letter Quality capability is ideal.

To the best of my knowledge there are only four Word Processing programs currently available for Sega. Two are available in cassette only, one in both cassette and disk and the other also as a cartridge. The following are reviews on above mentioned programs and in each case I have written the review using the respective program. They are all available through Sega Software Support.

32K WORD PROCESSOR
by Grandstand Leisure Products.

This is a cassette based Word Processor written for the BASIC LEVEL IIIB cartridge. Like all cassette based programs it is slow to load and if you were unsuccessful with loading for the first time repeated attempts would become frustrating.

Once the program is loaded the user has approximately 15K Bytes of memory for documents. The user is presented with a 10 option menu as follows.

0) Change document name.
1) View a document.
2) Enter a document.
3) List document titles.
4) Delete a document.
5) Search a document.
6) Print a document.
7) SAVE all documents.
8) LOAD a document.
9) Edit a document.

Each of the 10 options has instructions and options within themselves. Most are resonably self explainatory, although I was left confused by some of the results.

Under the SEARCH option I was given three more options:

1) Search all documents for a keyword.
2) Search for and replace a word in a document.
3) Return to the main menu.

Option 1) returned a list of documents and their names in which the keyword w as found.

Option 2) did what it said,although if the word being searched for was a single letter,it would replace all those letters with the replacement word. This produced an undesired result at a remarkable speed. I found the feature useful but had to be careful when using it.

The PRINT option offered a variety of prompts. These included options for Page headings;Justification of text to right hand margin;Single or multiple page document;Numbering of multiple pages; Number of Lines per page and finally an option to review all of the above. The only option that was missing was that that would allow the use of an 80 column printer via an interface in the printer/plotter port on your SC-3000 computer.

SAVING all documents was simple and well presented. A prompt to ready the user and insert title were given and on commencement of saving the familiar * Saving Start indicator was printed on the screen. The documents were saved in two parts on the tape and on completion of saving a VERIFICATION prompt was presented. When this was completed,the main menu was presented again. I was using a SEGA SR-1000 Dataset and had no difficulties in SAVING and VERIFYING documents.

LOADING files was easily accomplished too.

EDITING DOCUMENTS was a little more difficult than expected. Basic entry was easy but when shifting blocks of text was required,I found it to be impossible. Block erasement was easily done. Caps lock,centring of text and cursor homing were provided. A formatting function that almost worked was handy. It failed to format correctly when the beginning of a word was more than 5 characters from the end of the line. These words had to be formatted manually. Also while the formatting was turned ON and the cursor was moved up and down the text a disturbing form of formatting took place. I was unable to work out what this was actually trying to achieve and so made a point of turning formatting OFF when scrolling text.

Having a reasonable machine code content it is fast in performing it's task and for the $14:00 price tag is hardly over-priced. However,it falls short of even being close to the ideal Word Processing package,for reasons outlined above,but as there are few Word Processing packages available for your SEGA it would suffice until a satisfactory replacement is found.

EASY WRITER 16K OR 32K
by Grandstand Leisure Products

This is the baby brother to the 32K Word Processor. It is almost identical in it's operation but has a shortened Options List and similarly cut down set of functions within those options. It can handle only one document in memory at any given time and I found that documents created with the 32K only Word Processor were not compatible with this,even though memory space was available. It too is currently available at the cost of $14:00 and like Big Brother is far from ideal.

STOP PRESS!

The programs in this issue are now available on tape for $14.00 (incl. p&h). After Sept 30th ... $15.40. Order from Sega Software Support.

"BASWORD" BY MATE SOFTWARE LTD 1986

This program is available in both a cassette and disk based version,with the files written by either program being fully compatable with the other. I began writing this article using the cassette version but soon opted to use the disk. This was simply achieved by saving my text on cassette,changing my IIIB cartridge for the SF-7000 Disk Drive,loading the Basword Disk and finally choosing the cassette option,under the format command,so I could load my text from the cassette saved file. This may sound rather long and tedious but was completed within a few minutes. The only disturbing part of this proceedure was that upon Saving the original text,there was no means of Verifying it. The thought of relying on a 'single save',without verification,appeared a little optimistic. In this case my fears of loosing data were unwarranted.

The first really striking aspect of this program is the format that it takes. By this I refer to its' 'Line Numbering' action. This is the first hurdle to overcome if you have used using other Word Processors. There is a BEEP 2 warning when you reach two characters from the end of the line and a slight pause as wordwrap to the next line is performed. The BEEP 2 can be quite disconcerting and if you have nimble fingers,several characters can be missed during the wordwrap.

There are 28 valid commands in Basword and a break-down sheet of their functions is supplied in the package. Included in the disk version were three 'notes' files giving notes and hints for the user. These were clearly understandable but when printed on paper some symbols and characters did not appear as they did on screen. This is because they are not part of the Standard Character Set of most printers,yet are part of the Sega character set. It was pleasing to see within the notes an invitation to contact the author for additional information if printer problems were experienced. As well as this invitation,there were program change notes to enable the user to set the disk version to print with the SEGA SP-400 printer (it is supplied ready to drive a dot matrix printer via the parrallel port of the SF-7000).

All the editing commands were easy to use and most were fast in their execution (Delete,Kopy and Move blocks of text). Those that were slow were real slow. These involved Searching the text for a word or phrase to be changed or deleted and the search was archaicly slow due to a SEARCH WRITTEN IN BASIC. Adjusting of text,to suit your line length was also slow and had to be carried out in paragraph blocks to prevent the facility from removing paragraph markings. Although this was true it was still better than adjusting lines manually. The Justify to right hand margin was also very slow but made the presentation of a document much neater. I found the insetion of new lines was not notably slower than other program as it 'shifted text down' to accomodate.

The final function of a Word Processor,of course,is to produce paper copies of your document and Basword will give most people more than enough printing options. I have a STAR SG-10 printer that is capable of Near Letter Quality and many other facilities, and while I was satified with the options Basword offered,I was not able to utilise the all the desired facilities my printer has. Of course,you must consider that the current price of this printer is greater than the cost of my SC-3000 and SF-7000 collectively. It would still have been nice to be able to use its' 2K byte buffer (Basword appears to dump only one line of text to the printer at a time),change character sets and use the printer underline facilties just to name a few. This however does not detract any desirability from the Basword program.

To conclude,I must say that on initial impression,I was sceptical about the perforfance of this program but as I became accustomed to its' format and limitations I found it to be adequate. The program has good Word Processing functions but lacks the polish and speed required for a really good product. Priced at $28:50 for the cassette and $39:95 for the disk I do not consider it to be over-priced but as stated,find it lacking in some respects.

SEGAWORD 3 BY TREVOR YANN

Segaword 3 is one of a series of three Word Processor programs written by Trevor Yann and is disk based. Segaword One and Two are the cassette and cartridge versions of the same program. All three programs were marketed by John Sands of Australia until the company folded.

The package is well presented,comes in a plastic case with a 30 page User's Manual. The manual is also well presented and indexed with examples of all functions. Also included in the manual are explanations of Error Messages and a table of Default Values. The disk version has 18 command functions,all selectable by pressing the CTRL key and the functions' associated key. One of these is a HELP page,and this page allows you to view the remaining 17 functions along with their Control Codes.

The program is not listable except for one line that calls a machine code address but judging by its' speed I would say it is probably very close to being 100% machine code.

There is no visible delay in wordwrap performance as with Basword and apparently no limitation on its' on screen justification (Justification to 38 characters) except the 38 character line length. The limit set on justification on Hardcopy is that set by the user setting margin tabs and ultimately by the maximum number of columns printable by your printer. No Justification to right hand margin is available but this could be considered as unnecessary.

Variable margins can be set within a
document making it possible to have
consecutive paragraphs or even lines
within paragraphs different lengths.

There is no requirement to adjust text for line length as this is carried out automatically and instantly upon dumping to printer or using the Format function. The Format function allows you to view what the finished article will look like. If the printer line length is set greater than 38,then the cursor right,left and down keys must be used to view the full text.

Text manipulation was effortless and extremely fast. Block Move,Block Copy,and Block Delete are the main functions used here and a Full Screen Editor for Insertion,Deletion and Write Over all made their contribution to the finished product.

Reading and Writing files to and from disk was also easy and important files could be Write-Protected under BASIC. A Disk Write Error was returned if overwriting of a protected file was attempted. The only shortfall I found in the disk management was a View Files Facility. While this was true,it was possible to view the files on disk,without the current file in memory being lost,by pressing the Reset Key,viewing Files in the usual manner under BASIC,then Running the program again. If the Quit Processing function was used,the file in memory was lost.

File size was limited to 9991 bytes which is roughly equal to two fullscapt pages completely packed with text. As an indication,at this point in my review I now have 6700 bytes free and 5417 bytes still free on completion of this review. I consider this to be quite adequate remembering that 156K bytes of storage is available on the disk in the drive unit. Several files can realistically be used to complete a single long document. File merging is possible within the limits of memory availability.

Other functions included are Forced Page Break;Set Printer Control Codes; Kill Document In Memory;Reset Initial Options;Quit Processing;Move Cursor To Beginning Or End of Document;Search A Block Of Characters and of course Print A Document

The Search was simply a search for a word or phase and not search and replace. It was performed from where the cursor currently sat to the end of the document and fast was the only way to describe it.

The Print option allows the use of the Sega SP-400 or a Centronics printer. I used the centronics option and found that the buffer in my printer was utilised,making it possible to resume processing while the printer finished its' task.

To conclude I must say that I find Segaword 3 a pleasure to use and although it is the most expensive Word Processor, it is well worth the cost. It will soon be available through Sega Software Support.

HACKERS CORNER

THE Z80 OP CODES

by MICHAEL HOWARD

There are quite a number of Z80 machine code hackers out there, slaving away on their Segas till the early hours, and quite rightly so, machine code is the only way to go. Unfortunately, machine code can take a long time to write, and most of the delays in writing machine code are caused not by knowing what instruction to use in a particular instance, but what the code number is for an instruction. So being a thoughtful type of bloke, I decided to list ALL the instructions below, so now you have a quick reference chart for Z80 opcodes.

I mentioned ALL the Z80 opcodes, well that is not quite correct. When Zilog produced the Z80, they actually created about 90 other commands, mostly involving the IX and IY registers, they even included another type of shift. Unfortunately, these instructions did not get published, but they do exist, and next month I will show all of them, and how to use them.

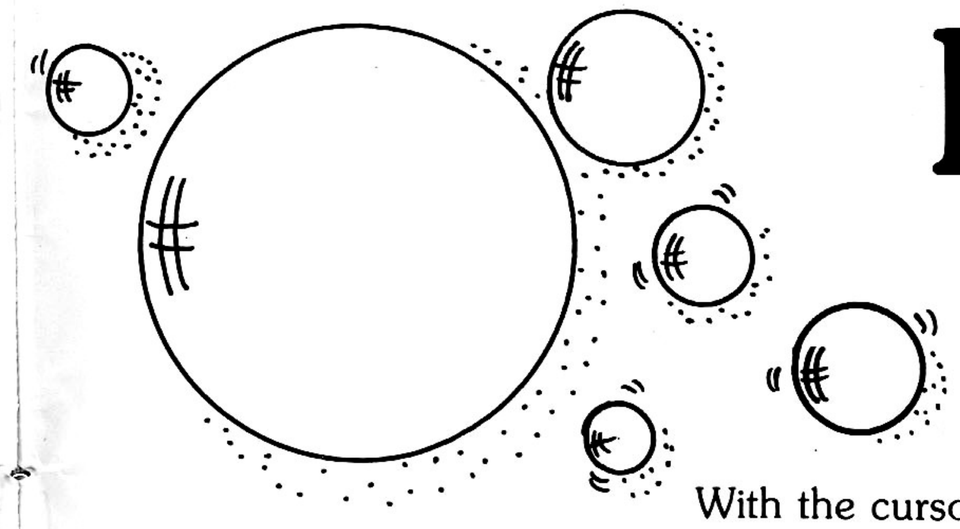
Thought for the month: The program you want is always on the other side of the Disc or Tape!!

Code	*Hex*	*Z80 assembler*	*– after CBh*
0	00	nop	rlc b
1	01	ld bc,NN	rlc c
2	02	ld (bc),a	rlc d
3	03	inc bc	rlc e
4	04	inc b	rlc h
5	05	dec b	rlc l
6	06	ld b,N	rlc (hl)
7	07	rlca	rlc a
8	08	ex af,af'	rrc b
9	09	add hl,bc	rrc c
10	0A	ld a,(bc)	rrc d
11	0B	dec bc	rrc e
12	0C	inc c	rrc h
13	0D	dec c	rrc l
14	0E	ld, c,N	rrc (hl)
15	0F	rrca	rrc a
16	10	djnz DIS	rl b
17	11	ld de,NN	rl c
18	12	ld (de),a	rl d
19	13	inc de	rl e
20	14	inc d	rl h
21	15	dec d	rl l
22	16	ld d,N	rl (hl)
23	17	rla	rl a
24	18	jr DIS	rr b
25	19	add hl,de	rr c
26	1A	ld a,(de)	rr d
27	1B	dec de	rr e
28	1C	inc e	rr h
29	1D	dec e	rr l
30	1E	ld e,N	rr (hl)
31	1F	rra	rr a
32	20	jr nz,DIS	sla b
33	21	ld hl,NN	sla c
34	22	ld (NN),hl	sla d
35	23	inc hl	sla e
36	24	inc h	sla h
37	25	dec h	sla l
38	26	ld, h,N	sla (hl)
39	27	daa	sla a
40	28	jr z,DIS	sra b
41	29	add hl,hl	sra c
42	2A	ld hl,(NN)	sra d
43	2B	dec hl	sra e
44	2C	inc l	sra h
45	2D	dec l	sra l
46	2E	ld,l,N	sra (hl)
47	2F	cpl	sra a
48	30	jr nc,DIS	
49	31	ld sp,NN	
50	32	ld (NN),a	

Code	*Hex*	*Z80 assembler*	*– after CBh*	*– after EDh*
51	33	inc sp		
52	34	inc (hl)		
53	35	dec (hl)		
54	36	ld (hl),N		
55	37	scf		
56	38	jr c,DIS	srl b	
57	39	add hl,sp	srl c	
58	3A	ld a,(NN)	srl d	
59	3B	dec sp	srl e	
60	3C	inc a	srl h	
61	3D	dec a	srl l	
62	3E	ld a,N	srl (hl)	
63	3F	ccf	srl a	
64	40	ld b,b	bit 0,b	in b,(c)
65	41	ld b,c	bit o,c	out (c),b
66	42	ld b,d	bit 0,d	sbc hl,bc
67	43	ld b,e	bit 0,e	ld (NN),bc
68	44	ld b,h	bit 0,h	neg
69	45	ld b,l	bit 0,l	retn
70	46	ld b,(hl)	bit 0,(hl)	im 0
71	47	ld b,a	bit 0,a	ld i,a
72	48	ld c,b	bit 1,b	in c,(c)
73	49	ld c,c	bit 1,c	out (c),c
74	4A	ld c,d	bit 1,d	adc hl,bc
75	4B	ld c,e	bit 1,e	ld bc,(NN)
76	4C	ld c,h	bit 1,h	
77	4D	ld c,l	bit 1,l	reti
78	4E	ld c,(hl)	bit 1,(hl)	
79	4F	ld c,a	bit 1,a	ld r, a
80	50	ld d,b	bit 2,b	in d,(c)
81	51	ld d,c	bit 2,c	out (c),d
82	52	ld d,d	bit 2,d	sbc hl,de
83	53	ld d,e	bit 2,e	ld (NN),de
84	54	ld d,h	bit 2,h	
85	55	ld d,l	bit 2,l	
86	56	ld d,(hl)	bit 2,(hl)	im 1
87	57	ld d,a	bit 2,a	ld a,i
88	58	ld e,b	bit 3,b	in e,(c)
89	59	ld e,c	bit 3,c	out (c),e
90	5A	ld e,d	bit 3,d	adc hl,de
91	5B	ld e,e	bit 3,e	ld de,(NN)
92	5C	ld e,h	bit 3,h	
93	5D	ld e,l	bit 3,l	
94	5E	ld e,(hl)	bit 3,(hl)	im 2
95	5F	ld e,a	bit 3,a	ld a, r
96	60	ld h,b	bit 4,b	in h,(c)
97	61	ld h,c	bit 4,c	out (c),h
98	62	ld h,d	bit 4,d	sbc hl,hl
99	63	ld h,e	bit 4,e	ld (NN),hl
100	64	ld h,h	bit 4,h	
101	65	ld h,l	bit 4,l	

Code	Hex	Z80 assembler	– after CBh	– after EDh
102	66	ld h,(hl)	bit 4,(hl)	
103	67	ld h,a	bit 4,a	rrd
104	68	ld l,b	bit 5,b	in l,(c)
105	69	ld l,c	bit 5,c	out (c),l
106	6A	ld l,d	bit 5,d	adc hl,hl
107	6B	ld l,e	bit 5,e	ld de,(NN)
108	6C	ld l,h	bit 5,h	
109	6D	ld l,l	bit 5,l	
110	6E	ld l,(hl)	bit 5,(hl)	
111	6F	ld l,a	bit 5,a	rld
112	70	ld (hl),b	bit 6,b	
113	71	ld (hl),c	bit 6,c	
114	72	ld (hl),d	bit 6,d	sbc hl,sp
115	73	ld (hl),e	bit 6,e	ld (NN),sp
116	74	ld (hl),h	bit 6,h	
117	75	ld (hl),l	bit 6,l	
118	76	halt	bit 6,(hl)	
119	77	ld (hl),a	bit 6,a	
120	78	ld a,b	bit 7,b	in a,(c)
121	79	ld a,c	bit 7,c	out (c),a
122	7A	ld a,d	bit 7,d	adc hl,sp
123	7B	ld a,e	bit 7,e	ld sp,(NN)
124	7C	ld a,h	bit 7,h	
125	7D	ld a,l	bit 7,l	
126	7E	ld a,(hl)	bit 7,(hl)	
127	7F	ld a,a	bit 7,a	
128	80	add a,b	res 0,b	
129	81	add a,c	res 0,c	
130	82	add a,d	res 0,d	
131	83	add a,e	res 0,e	
132	84	add a,h	res 0,h	
133	85	add a,l	res 0,l	
134	86	add a,(hl)	res 0,(hl)	
135	87	add a,a	res 0,a	
136	88	adc a,b	res 1,b	
137	89	adc a,c	res 1,c	
138	8A	adc a,d	res 1,d	
139	8B	adc a,e	res 1,e	
140	8C	adc a,h	res 1,h	
141	8D	adc a,l	res 1,l	
142	8E	adc a,(hl)	res 1,(hl)	
143	8F	adc a,a	res 1,a	
144	90	sub b	res 2,b	
145	91	sub c	res 2,c	
146	92	sub d	res 2,d	
147	93	sub e	res 2,e	
148	94	sub h	res 2,h	
149	95	sub l	res 2,1	
150	96	sub (hl)	res 2,(hl)	
151	97	sub a	res 2,a	
152	98	sbc a,b	res 3,b	
153	99	sbc a,c	res 3,c	
154	9A	sbc a,d	res 3,d	
155	9B	sbc a,e	res 3,e	
156	9C	sbc a,h	res 3,h	
157	9D	sbc a,l	res 3,l	
158	9E	sbc a,(hl)	res 3,(hl)	
159	9F	sbc a,a	res 3,a	
160	A0	and b	res 4,b	ldi
161	A1	and c	res 4,c	cpi
162	A2	and d	res 4,d	ini
163	A3	and e	res 4,e	outi
164	A4	and h	res 4,h	
165	A5	and l	res 4,1	
166	A6	and (hl)	res 4,(hl)	
167	A7	and a	res 4,a	
168	A8	xor b	res 5,b	ldd
169	A9	xor c	res 5,c	cpd
170	AA	xor d	res 5,d	ind
171	AB	xor e	res 5,e	outd
172	AC	xor h	res 5,h	
173	AD	xor l	res 5,l	
174	AE	xor (hl)	res 5,(hl)	
175	AF	xor a	res 5,a	
176	B0	or b	res 6,b	ldir
177	B1	or c	res 6,c	cpir
178	B2	or d	res 6,d	inir
179	B3	or e	res 6,e	otir
180	B4	or h	res 6,h	
181	B5	or l	res 6,l	
182	B6	or (hl)	res 6,(hl)	
183	B7	or a	res 6,a	
184	B8	cp b	res 7,b	lddr
185	B9	cp c	res 7,c	cpdr
186	BA	cp d	res 7,d	indr
187	BB	cp e	res 7,e	otdr
188	BC	cp h	res 7,h	
189	BD	cp l	res 7,l	
190	BE	cp (hl)	res 7,(hl)	
191	BF	cp a	res 7,a	
192	C0	ret nz	set 0,b	
193	C1	pop bc	set 0,c	
194	C2	jp nz,NN	set 0,d	
195	C3	jp NN	set 0,e	
196	C4	call nz,NN	set 0,h	
197	C5	push bc	set 0,l	
198	C6	add a,N	set 0,(hl)	
199	C7	rst 0	set 0,a	
200	C8	ret z	set 1,b	
201	C9	ret	set 1,c	
202	CA	jp z,NN	set l,d	
203	CB		set l,e	
204	CC	call z,NN	set 1,h	
205	CD	call NN	set 1,l	
206	CE	adc a,N	set 1,(hl)	
207	CF	rst 8	set 1,a	
208	D0	ret nc	set 2,b	
209	D1	pop de	set 2,c	
210	D2	jp nc,NN	set 2,d	
211	D3	out N,a	set 2,e	
212	D4	call nc,NN	set 2,h	
213	D5	push de	set 2,l	
214	D6	sub N	set 2,(hl)	
215	D7	rst 16	set 2,a	
216	D8	ret c	set 3,b	
217	D9	exx	set 3,c	
218	DA	jp c,NN	set 3,d	
219	DB	in a,N	set 3,e	
220	DC	call c,NN	set 3,h	
221	DD	prefixes instructions using ix	set 3,1	
222	DE	sbc a,N	set 3,(hl)	
223	DF	rst 24	set 3,a	
224	E0	ret po	set 4,b	
225	E1	pop hl	set 4,c	
226	E2	jp po,NN	set 4,d	
227	E3	ex (sp),hl	set 4,e	
228	E4	call po,NN	set 4,h	
229	E5	push hl	set 4,l	
230	E6	and N	set 4,(hl)	
231	E7	rst 32	set 4,a	
232	E8	ret pe	set 5,b	

continued on p. 31



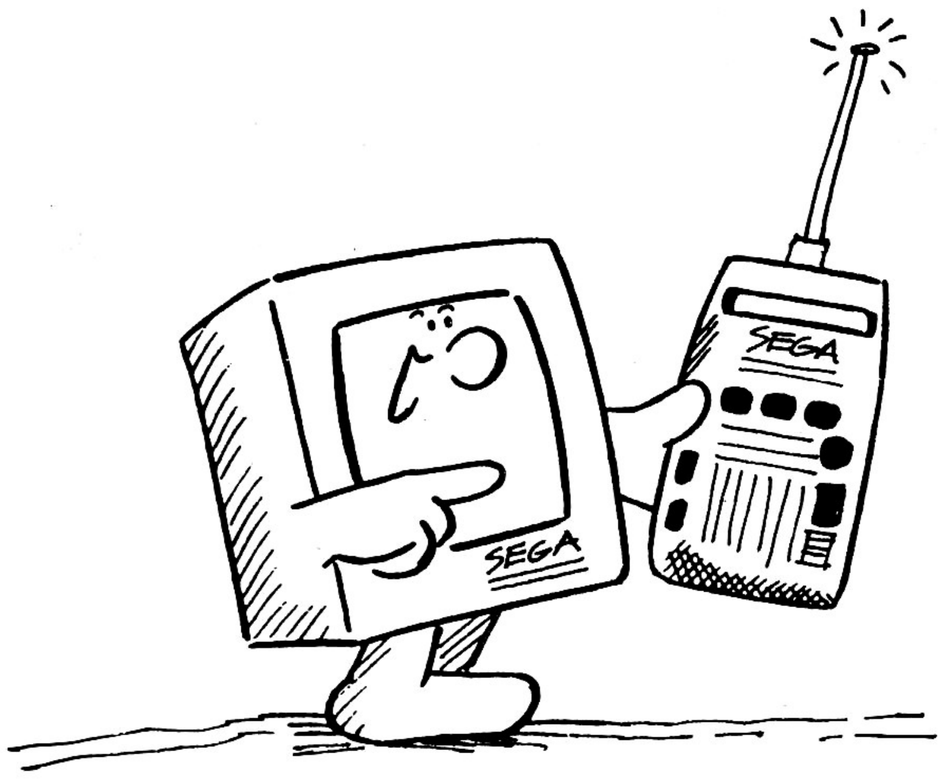
Bubble Trouble

. . . by Aaron Boulton

Aaron Boulton, the author of 'Bill's Basement' has done some really nifty programming to fit this simple yet addictive game into a few lines of code.

With the cursor keys you guide a bubble down a set of tubes which are different every time.
You have precious little time to get to the end before a wall of water destroys you!
It works on disk BASIC as well.

```
10 REM BUBBLE TROUBLE
20 REM ==============
30 REM by Aaron Boulton
40 REM Auckland, 1986
50 REM
60 GOSUB 400
70 SCREEN2,2:CLS:MAG0:COLOR1,1,(0,0)-(255,191),1:COLOR,12,(0,150)-(255,191)
80 T=0:Z=1:W=30:B=60:SC=0:E=3:R=0:LINE(0,150)-(255,150),1
90 LINE(47,152)-(218,164),15,B
100 CURSOR50,155:COLOR1:PRINTCHR$(17);"BUBBLE TROUBLE";CHR$(16)
110 FORSA=110TO1000STEP40:SOUND1,SA,15:NEXT:SOUND0:BLINE(0,0)-(255,149),,BF:GOSU
B250
120 SC=SC+T*10:CURSOR66,170:PRINTCHR$(5)
130 COLOR1:CURSOR30,170:PRINT"SCORE:";:COLOR15:PRINTSC:COLOR1:CURSOR30,180:PRINT
"TIME :";:COLOR15:PRINTT
140 D=0:X=5:Y=R:Z=Z+1:T=100:IFZ>ETHENE=E+3:W=W-2
150 IFT<1THEN290
160 IFA$=CHR$(30)THENY=Y-3
170 IFA$=CHR$(31)THENY=Y+3
180 IFA$=CHR$(28)THENX=X+3
190 IFA$=CHR$(29)THENX=X-1
200 T=T-1:X=X+.5:Y=Y+.5:PATTERNS#0,"387CEEF6F6FE7C38":SPRITE0,(X,Y),0,15:A$=INKE
Y$
210 CURSOR66,180:PRINTCHR$(5);T
220 IFVPEEK(INT((Y+4)/8)*256+INT((X+4)/8)*8+YMOD8)>0THEN320
230 PATTERNS#0,"3C7EF7FBFB7E3C00":IFX>246THENZ=Z+1:SPRITE0,,0,0:GOTO110
240 GOTO150
250 R=B+5:FORA=0TO205STEP50:FORQ=0TO3:LINE(A,B+Q)-(A+55,B+D+Q),15:LINE(A,(B+W-Q)
)-(A+55,(B+W+D-Q)),15:NEXT:B=B+D:D=INT(RND(1)*50-25)
260 IFB+D<2THENB=2:D=0
270 IFB+D>115THENB=115:D=0
280 NEXT:RETURN
290 PAINT(0,R),4
300 ER=15:OUT127,228:FORX=240TO255STEP3:OUT127,X:SOUND5,2,ER:ER=ER-3:NEXT:SOUND0
310 CURSOR30,140:COLOR15:PRINT"THE WATER DESTROYED YOUR BUBBLE":GOTO330
320 ER=15:OUT127,228:FORX=240TO255STEP3:OUT127,X:SOUND5,1,ER:ER=ER-3:NEXT:SOUND0
330 PATTERNS#0,"91520003C0004A89":FORER=1TO125:NEXT:SPRITE0,,0,0
340 BLINE(60,50)-(140,80),,BF:COLOR,15,(60,50)-(140,80):COLOR1
350 CURSOR65,53:PRINT"ANOTHER GO ?":CURSOR65,70:PRINT"(Y/N)"
360 IFINKEY$=""THEN360
370 IFINKEY$="N"THENEND
380 IFINKEY$="Y"THEN70
390 GOTO360
400 CLS:PRINT:PRINT
420 COLOR 4
430 PRINT"    B U B B L E   T R O U B L E"
440 PRINT"    -----------   ------------"
470 PRINT:PRINT
480 PRINT"You are one of those helpless little"
490 PRINT"Bubbles floating around in one of the"
500 PRINT"Worlds many pipelines, You must "
510 PRINT"complete each pipeline before the"
520 PRINT"time limit is up, or else You will":PRINT"get washed away."
530 PRINT:PRINT"Use the cursor keys to move your":PRINT "Bubble."
540 PRINT :PRINT :PRINT"          ANY KEY CONTINUES"
550 IFINKEY$=""THEN550
560 RETURN
```

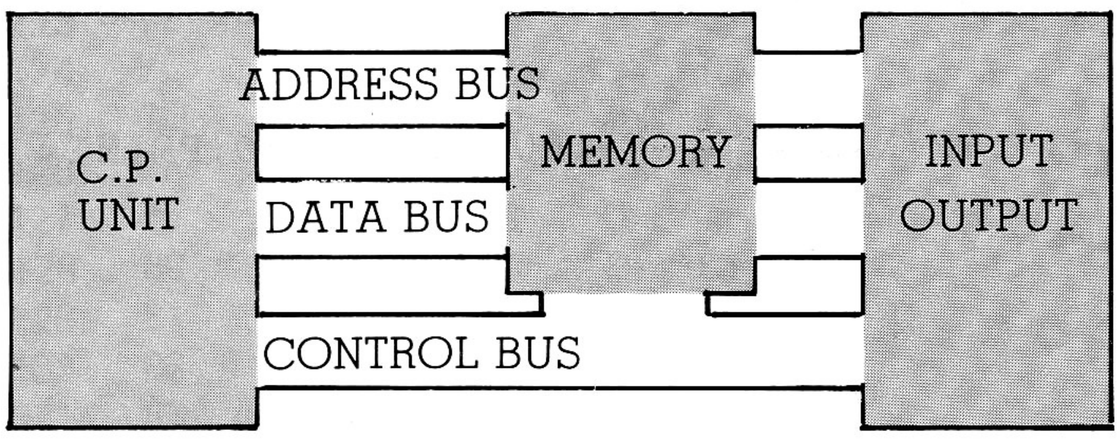


Part 1
The SEGA Computer - AN OVERVIEW by Brian Brown

The SEGA SC3000 home computer is an excellent addition to the computer scene with information, good graphics and sound. This seeks to add to the growing knowledge of the internal workings of the SEGA, and in so doing, help others in their search for better and quicker ways of programming.

BASIC OPERATION PRINCIPLES

The SEGA computer can be represented as three main components,



CENTRAL PROCESSING UNIT (CPU)

This device communicates with all the devices connected to it, and transfers information between the devices as required. This may involve the manipulation of the data internally within the CPU.

MEMORY

There are two types of memory used, Read Only and Random Access memory (ROM and RAM). The ROM contains the BASIC language (Beginners All-purpose Symbolic Instruction Code), and the necessary programs which enable the CPU to communicate with all the other devices. The contents of the ROM are retained when the power is turned off. ROM can only be Read by the CPU, and is a sort of text book from which the CPU gets the necessary instructions informing it of what to do. RAM is used for temporary program storage, and its contents disappear when the power is turned off. This explains why you must transfer your program to cassette tapes or disk. RAM can be thought of as a blackboard where information can be both written onto it and erased.

INPUT/OUTPUT DEVICES

These devices allow the user to communicate with the CPU and allows feedback from the CPU to the user. An example of an input/output device is the keyboard and Video Display.

COMMUNICATION BETWEEN DEVICES

Each device connected to the CPU is given a unique box number (ADDRESS). The CPU can communicate with the specific device by placing its box number (ADDRESS) on the ADDRESS BUS. A bus is a common highway which allows communication between devices. Having placed the right address on the bus, (ie. selected the correct box number), the CPU can then read from or write to the selected device. The CPU transfers information between devices in BINARY format.

The smallest element in binary is a BIT. A bit is represented as having one of two possible states, ON or OFF. The ON state is normally designated '1' whilst the OFF state is designated at '0'.

The CPU however, can work with eight bits at a time. This group of eight bits is called a BYTE. A byte can be thought of as eight buckets, where each bucket could be full or empty. It thus follows that the maximum number of combinations possible with eight bits is 256. Each address (box) is capable of storing eight bits, thus any box can have as its contents a value of between 0 and 255.

The CPU moves the bytes around via the DATA BUS. In this case the DATA BUS is bidirectional, ie information can travel from the CPU to a device or from a device to the CPU. Each device is connected to the address bus which is used by the CPU to tell the device that the CPU can access any one of 65536 possible locations (or boxes which hold 8 bits each). To inform the devices as to which way the information is travelling on the data bus, a CONTROL BUS is used. This control bus informs the device if it should expect to receive data (ie a write) or whether it should present data so that the CPU can read it (ie a read). The CPU has temporary storage boxes inside it called REGISTERS. When the CPU wishes to transfer information from one address to another, the CPU carries out the following sequences:

1. Places the correct address (box number) on the address bus
2. Reads the contents of the selected address via the data bus
3. Transfers the information to one of its registers
4. Places the destination address on the address bus
5. Transfers the contents of its register onto the data bus
6. Informs the device at that address to get the new contents for that address, which is appearing on the data bus

INPUT/OUTPUT PORTS

The CPU can have up to 256 separate ports. These are selected by an eight bit value on the address bus, and the use of a special signal on the control bus. This special

signal is activated when you use the command OUT or INP in basic. These ports can each hold an eight bit value. Not all of the ports are used, so refer to the section dealing with the memory mapping arrangements for further information.

This covers the sequence of operations in a relatively simple manner, and has served to introduce the reader to some of the more technical terms which will be used shortly.

BINARY & DECIMAL

A byte of eight bits has already been introduced. These eight bits can be either on or off, so a byte in binary could be represented as follows:

```
B7  B6  B5  B4  B3  B2  B1  B0
1   1   1   0   1   0   1   1
```

Bit seven is the bit which has the greatest value, while bit zero has the least value. Bit seven is thus called the MOST SIGNIFICANT BIT (MSB) while bit zero is called the LEAST SIGNIFICANT BIT (LSB). In terms of the decimal value of each bit, the following example should help:

```
Decimal Value  128  64  32  16   8   4   2   1
Binary Digit    B7  B5  B5  B4  B3  B2  B1  B0
```

thus a byte of 11000000 will have a decimal value of 192, because bit 7 and bit 6 are both '1', so the decimal result is 128464. Where a '1' occurs, the decimal value is added, while all '0's are ignored.

HEXADECIMAL NOTATION

Binary numbers of eight bits are sometimes tedious to write down, so a method was devised in which the binary numbers are represented in another form. This form is known as HEXIDECIMAL (hex). It has a number base of 16 digits (decimal has 10, binary has two). The equivalent decimal, binary, and hex values are listed below:

BINARY	DECIMAL	HEXIDECIMAL
0000	0	0
0001	1	1
0010	2	2
0011	3	3
0100	4	4
0101	5	5
0110	6	6
0111	7	7
1000	8	8
1001	9	9
1010	10	A
1011	11	B
1100	12	C
1101	13	D
1110	14	E
1111	15	F

As shown, hex ranges from 0 to F. When the hex number is larger, ie 16 in decimal then the hex number becomes 10. This is exactly the same as in decimal when you go from 9 to 10.

Looking at a byte (eight bits), the four least significant bits are called the LOWER NIBBLE, while the four most significant bits are called the UPPER NIBBLE. (A nibble is 4 bits).

```
Upper Nibble          Lower Nibble
B7  B6  B5  B4        B3  B2  B1  B0
 1   1   0   1         0   1   1   1   Binary value
                                       of each bit
```

To represent this in hex requires two hex digits, as each hex digit can only represent four bits. The upper and lower nibbles are converted to hex digits, with the resultant hex digits being written with the most significant one first. In the example above:

1101 in binary is '13' decimal so thats 'D' in hexidecimal
0111 in binary is ' 7' decimal so thats '7' in hexidecimal

so the corresponding hex digits which represent the byte 11010111 is 'D7'. Hexidecimal digits are prefixed with &H in SEGA basic, and the hexidecimal value of any decimal number can be found by using HEX$.

NUMERIC VALUES

The same 'number' can be represented in many ways but our common method is called 'decimal' or base 10. Thus 423 is 4x(10x10) + 2x10 + 3x1

To denote different number bases, a number is preceded by B (for binary - base 2) or H (hex - base 16).

H1A7 is 1x(16x16) + Ax16 + (7x1)
ie 256 + 160 + 7
ie 423 (decimal)

B110100111 is:
$1x(2^8) + 1x(2^7) + 0x(2^6) + 1x(2^5) + 0x(2^4) + 0x(2^3) + (1x2^2) + (1x2) + 1$
ie 423 (decimal)
ie 256 + 128 + 32 + 4 + 2 + 1

Generally, only hex and/or decimal conversions are required.

The program CONVERTER will convert to binary as well.

The SEGA computer has two main sections, HARDWARE and SOFTWARE. Hardware refers to the physical reality or components, whilst software refers to the programs which control the hardware.

HARDWARE: The hardware can be split into several main sections.

1. **CENTRAL PROCESSOR:** This is a Z80 8bit processor. It has a maximum address range of 65535 bytes. The first 32K is occupied by the Basic ROM or Games ROMs, while the other 32K is for RAM.

2. **VIDEO DISPLAY:** The Video Chip is a Texas Instruments TMM9929A. This provides up to four display modes, 32 sprites, 20 millisecond interrupt generator, and 16K bytes of dedicated RAM. The Video Ram has no connection to the central processor, and is updated by writing to the VDP. The VDP is port mapped and &HBE and &HBF. The internal structure of the VDP and its programming will be detailed later.

3. SOUND GENERATOR: This is an SN76487AN chip. It has three sound channels and a noise generator. Each channel has its own programmable attenuator for controlling the output volume. It is IC4 on the main PC board, and its programming in later on.

4. SYSTEM RAM: This is a 2Kbyte chip 8212 (IC3). It is memory mapped at address's &H0000 to &HC7FF. It is used for stack and data storage by plug-in cartridges.

5. INPUT/OUTPUT DEVICES: These include the keyboard, printer, joy-sticks and cassette. The devices are connected to the computer system via a programmable interface chip, a 8255 PIA (IC5). This PIA has three ports and a control register. The information sent to the control register determines whether the ports will be read or write or both.
The ports are labelled as follows:
PORT A located at address &HDC Keyboard Matrix
PORT B located at address &HDD Keyboard Matrix
PORT C located at address &HDE Keyboard Control
PORT D located at address &HDF Control Register
The actual programming of this PIA will be covered in a later issue.

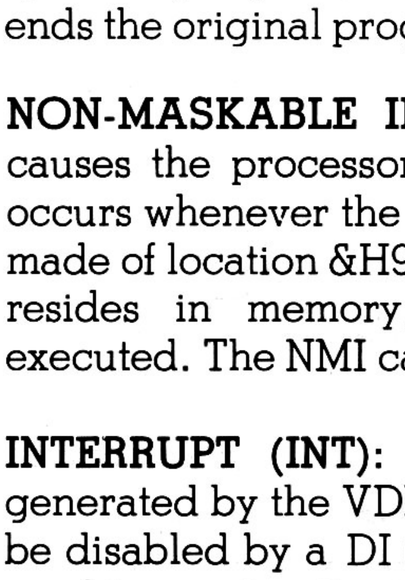
6. ADDRESS DECODER: This is achieved by IC2. A logic level of zero on the appropriate CS lead will enable that particular chip. Only one device may be enabled at any time. The CPU can only talk/listen to one device at a time, so it is the function of the address decoder to prevent more than one device interacting with the CPU at any moment.

INTERRUPTS: The SEGA computer operates with two interrupts. An interrupt is a halting of the process being carried out by the processor, a jump is then made to a specific program in memory, and when this program ends the original program is resumed.

NON-MASKABLE INTERRUPT (NMI): The interrupt causes the processor to jump to address &H0066. This occurs whenever the RESET button is pushed. A check is made of location &H97E2 which stores whether a program resides in memory, then the start-up routines are executed. The NMI cannot be disabled.

INTERRUPT (INT): This is used for TIME$ and is generated by the VDP chip every 50 milli-seconds. It can be disabled by a DI (disable interrupts) command using machine-code. It must also be noted that the SEGA computer also uses Interrupt Mode 1, which forces INT to address &H0038.

THE SEGA MEMORY: The SEGA uses a Z80 microprocessor, thus has a maximum address range of 64K.



All Basic programming packs occupy 0000 to 7FFF, and comprise not only ROM but also RAM is located at C000 to C7FF. There is NO onboard ROM! The Video RAM, keyboard, sound generator, and printer are all bank-selected using 1/0 ports. Game Cartridges use the system RAM chip located at C000 to C7FF which is the only memory which is on-board. RAM is always located in 7FFF to FFFF.

INPUT/OUTPUT PORTS:

7F	SOUND	SN74689AN Sound Generator.
DC	PORT A	Keyboard Matrix
DD	PORT B	Keyboard Matrix
DE	PORT C	Keyboard Control
DF	CONTROL	PIA Intel 8255
BE	VDP	TMM9929A VDG.(+16K VRAM)
BF	VDP	Other part of VDG

FOUR COLOUR PRINTER/PLOTTER: The printer is run by a dedicated 8 bit micro-computer, type 6805. This CPU has the ROM built inside the actual chip, and thus, if it goes faulty, it must be thrown away. The mechanism is standard, and is used in a wide range of printers, eg. Sharp, Commodore, Casio, etc. Some parts are thus interchangeable.

SOFTWARE:

BASIC CARTRIDGES: the Basic cartridges (LVIIIA/B). contain a 32K ROM chip and also RAM chips. The Basic operating system must use some of the RAM space for the storage of variables etc, (ie reserved Ram areas), thus this explains why only 26620 bytes are available to the user when using the level IIIB cartridge.

THE LEVEL IIIB CARTRIDGE: This contains a 32K ROM, 4 16Kx4bit RAM chips, and a few support chips.

GAMES: The games cartridges usually contain a single ROM chip. The on-board system RAM located at &HC000 is used for temporary storage of variables and the system stack. Some cartridges do use two ROM chips.

SEGA BASIC ROM: It occupies the first 32K of memory space. This leaves only 32K left for RAM. The Basic ROM contains the BASIC Language, and allows the user to program the computer using English type statements. The necessary routines to manage the keyboard, printer sound generator etc are all part of the BASIC Language. These routines may be called independently so that a programmer can use them as part of his own program. This is achieved by use of the CALL statement from BASIC.

RESERVED RAM AREAS : &H8000 - &H97FF
In order for Basic to convert data from one form to another, and to execute commands or run programs, it must reserve storage space for this purpose. The reserved Ram is also used to store pointers which hold the address or location of the program in memory, the data being used, variables and their values, what line number is being executed, the colour and cursor information, the character and sprite patterns, etc. Table XXX1 lists some relevant reserved locations.

BASIC PROGRAM POINTERS: Whenever a Basic program is typed in or RUN, the Basic Language in ROM must know where to locate the program, whereabouts the

program ends, where the variables are and what their names are, etc. Basic thus stores all this information in a Reserved RAM area, reserved because if this information is lost or destroyed, then the program will fail to execute properly, it at all. Each location in the Reserved RAM area holds a specific value, eg, memory locations &H8160 and &H8161 store the address of the start of a BASIC program. To determine the start address in hexadecimal, type the following:

BASIC LINE STORAGE FORMAT: When a line of Basic program is typed into the computer, it is stored in an area of designated free RAM. The way that each line is stored in memory is as follows:

Byte 1	Number of bytes in the Line
Byte 2	Least significant Byte of Line number
Byte 3	Most significant Byte of the Line number
Byte 4	Zero
Byte 5	Zero
Byte 6 to Byte N-1	Basic line contents
Byte N	Always a carriage return &H0D

The end of each Basic line is terminated by a carriage return (CR). If this occured before it should, the BASIC Language would erase the rest of the line contents. Occasions where this might happen are explained in the section on String Packing.

TOKENISED BASIC KEYWORDS: Basic keywords are stored in memory as a single hex byte. This saves memory space. When programs are listed or printed, the keywords are expanded into their full meaning. Table XXX2 has a listing of the hex bytes and their equivalent Basic keyword. When counting the number of bytes in a line, keywords are counted as a single byte only.

STRING PACKING: String packing refers to the imbedding within REM statements of a machine-code routine. Because Sega Basic always starts at the same address in memory (&H9800) then this becomes relatively easy. It must be remembered that the machine-code routine cannot have &HOD or 13 decimal in it, else Basic will think that the line has actually finished, and the remaining machine-code will be lost. Refer to the program listed in Table XX21 for an example of this. Once the program has been RUN, press break and list line 5. The machine-code data statements and poke routine can then be deleted, and the code can be saved as part of a normal program. (Table XX21 in later issue).

COLOUR BYTES: Locations &H9339 and &H933A hold the colour information for the text and graphics screens respectively. The byte is split up into two halves, the first half controls the writing colour, and the other half the background colour. Refer to Table XXX7 for the values which determine each colour. If a Red text on Yellow background is required in the text mode, POKE &H9339, &H8B (8 = Red, B = Yellow).

INKEY$ STORAGE AREAS: Locations &H9460 onwards store the value received from the keyboard during an INKEY$ statement. Table XXX4 lists the appropriate key, value and location for each key press. Note that each key pressed returns a different value, and that several locations are used to store the returned values.

USING INKEY$ WITH HYBRID PROGRAMS: A hybrid program is a mixture of machine code and Basic. This technique allows fast speed and ease of programming. A typical layout follows:

```
5  REM machine-code program poked into here
10 A$=INKEY$: CALL &H9808 : GOTO 10
20 REM &H9808 is start address of mcode
30 REM and tests key value returned in
40 REM locations &H9460-, then moves the
50 REM ship left, right, fires etc
```

ERRORS MESSAGES: The Basic Error messages are stored at &H73E8 to &H7676. The routine at &H73B7 is used to determine the actual error, and then print it to the screen. The code of the error is passed to the routine, which searches a table for the error code, then loads the text message that follows the error code. The following program lists the various errors and their appropriate code.

```
 5 REM MMMMMMMMMMMMMMMMMMMMMMMM
10 SCREEN 1,1: CLS
20 FOR X=&H9808 TO &H980E
30 READ A: POKE X,A: NEXT
40 FOR Y=O TO 70: POKE &H9809,Y
50 PRINT "Y=";Y;" ";: CALL &H9808
60 PRINT: NEXT Y
70 DATA &H3E,0,&H4F,&HCD,&HB7,&H73
80 DATA &HC9
```

POWER-UP DIAGNOSTICS ROUTINES: The Sega computer, on power-up, carries out a self-check on the various internal components. Should a failure occur, a jump is made to the fault indication routine, and an audible indication is given to the user. These indications are:

Single Beep = RAM Failure &H6809
Double Beep = ROM Failure &H680D
Triple Beep = Failure &H6811

ROM ROUTINES: These routines are used by the CPU when it communicates with the devices connected to it. These routines can be called independently by the programmer, using a CALL statement. Table XXX3 lists some important ROM routines.

```
10 REM *** CONVERTER  ***
20 REM Converts DECIMAL numbers
30 REM to BINARY and HEX
40 REM Peter Biggs 1986
50 REM
60 CLS:NUM$="0123456789ABCDEF"
70 PRINT"Converting DECIMAL Numbers"
80 PRINT"to BINARY and HEX formats":PRINT:PRINT
90 PRINT"Input DECIMAL number:  "
100 INPUT DN:IF DN<=0 THEN 60
110 BASE=2:PRINT:PRINT"BINARY:      ";
120 IF BASE=16 THEN PRINT:PRINT"HEXADECIMAL: ";
130 DB=DN:J=INT(LOG(DB)/LOG(BASE)+10^(-8))
140 FOR I=J TO 0 STEP -1
150 L=INT(DB/BASE^I):DB=DB-L*BASE^I
160 PRINTMID$(NUM$,L+1,1);:NEXT
170 IFBASE=2 THEN BASE=16:GOTO 120
180 PRINT:FOR I=1 TO 38:PRINT"-";:NEXT
190 PRINT:GOTO70
```

Table XXX1. RESERVED RAM AREAS.

Hex Address	Purpose
8160/8161	Start of Basic program
8162/8163	End of Basic program
8164/8165	String Storage pointer
8166/8167	Top of String Storage
8168/8169	Top of Memory pointer
82A2	Program found flag, 0 = found
82A3	Filename being loaded (16 bytes)
83A3	Filename being saved (16 bytes)
8B30	Basic Stack Area
8B36	&H80 bytes. Write to VRAM &H1800 +
9336	Screen control
9339	Colour text screen byte
933A	Colour graphics screen byte
9364	&H80 bytes VRAM stores &H1800 +
9411	Top range of cursor
9412	Bottom range of cursor
9413	8 bytes for storage of PATTERN command
9420	&H28 bytes for storage of VRAM data
9460/9480	INKEY$ Storage area
9484	Cursor, 0 = normal, 2 = graphics
9485	1 = lowercase, 0 = uppercase
9486	Keybeep, 0 = beep, 1 = nobeep
9489	Cursor position X value
948A	Cursor position Y value
948E	Time$ seconds
948F	Time$ minutes
9490	Time$ hours
9744/9745	Address of DATA byte

TABLE XXX3. ROM ROUTINES

Hex Address	Nature of Routine
10C0 - 17BF	Character table (8x8) for VDP
17C0 - 19FF	Basic keywords
1CB1	Determination of free bytes
2310	Get next character into DE
2400	Write character in A to video screen
2BD4 (2BD1)	Read 80 bytes data from VRAM (&H1800) to &H9364, write 80 bytes from &H8B36 to VRAM (&H1800), move 80 bytes at &H9364 to &H8B36
2C2A (2BCE)	Read data from VRAM
2C32 (2BCB)	Write address in HL to VDP for VRAM read
2C3D (2BC8)	Write data to VRAM
2C44 (2BC5)	Write address in HL to VDP for VRAM write
2C51 (2BC2)	Read VDP Status register
2C54 (2BBF)	Write to a VDP register. Data in A, Register in C.
3604	Hex conversion routines
3A03	Delay using the BC register
3AOF	Write Sync bytes to tape
3A12	Write byte to tape
3B33	Write 8 bytes from &H9413 to VRAM
3D32	SCREEN 1,1
3D90	SCREEN 2,2
3DEE	Initialise Text and Graphic screens
3FA0 - 411F	Keyboard characters arranged in matrix form
4120 - 4258	Basic keyboard symbol table
4590	Reset TIME$ to "00:00:00"
4756	Change cursor to graph
475E	Change cursor to normal
4766	Change input to lowercase
476E	Change input to uppercase
4918	INKEY$
4A6F	Write text pointed to HL to current screen position
6800	Restart 00H (Power)
6803	Restart 38H (VDG)
6806	NMI Entry (Reset)
6AB5	Print FRE routine
6C37	RUN
779F	VERIFY
78EF	LOAD
7A40	SAVE

Table XXX2. BASIC KEYWORDS

82	LIST	A0	ON	C1	*	BC	MOTOR
83	LLIST	A1	RETURN	C2	/	E0	FN
84	AUTO	A2	ERASE	C3	MOD	E1	TO
85	DELETE	A3	CURSOR	C4	+	E2	STEP
86	RUN	A4	IF	C5	-	E3	THEN
87	CONT	A5	RESTORE	C6	< > or > <	E4	TAB
88	LOAD	A6	SCREEN	C7	> = or = >	E5	SPC
89	SAVE	A7	COLOR	C8	< = or = <	CC	NOT
8A	VERIFY	A8	LINE	C9	>	CD	AND
8B	NEW	A9	SOUND	CA	<	CE	OR
8C	RENUM	AA	BEEP	CB	=	CF	XOR
90	REM	AB	CONSOLE	8080	ABS	8081	RND
91	PRINT or ?	AC	CLS	8082	SIN	8083	COS
92	LPRINT or L?	AD	OUT	8084	TAN	8085	ASN
93	DATA	AE	CALL	8086	ACS	8087	ATN
94	DEF	AF	POKE	8088	LOG	8089	LGT
95	INPUT	B0	PSET	808A	LTW	808B	EXP
96	READ	B1	PRESET	808C	RAD	808D	DEG
97	STOP	B2	PAINT	808E	PI	808F	SQR
98	END	B3	BLINE	8090	INT	8091	SGN
99	LET	B4	POSITION	8092	ASC	8093	LEN
9A	DIM	B5	HCOPY	8094	VAL	8095	PEEK
9B	FOR	B6	SPRITE	8096	INP	8097	FRE
9C	NEXT	B7	PATTERN	8098	VPEEK	8099	STICK
9D	GOTO	B8	CIRCLE	809A	STRIG	80A0	CHR$
9E	GOSUB	B9	BCIRCLE	80A1	HEX$	80A2	INKEY$
9F	GO	BA	MAG	80A3	LEFT$	80A4	RIGHT$
C0	^	BB	VPOKE	80A5	MID$	80A6	STR$
				80A7	TIME$		

TABLE XXX4. INKEY$ STORAGE AREAS.

Memory Location	Keys Monitored	Values Returned
&H9460	IQAZ,KI	1-8,32-128
&H9461	2WSXspc,.,LO	1-128
&H9462	3EDCclr/;PO	1-128
&H9463	4RFV,del,pi.@	1-128
&H9464	5TGBcd][	1-128
&H9465	6YHNcl,cr	1-8,32-128
&H9466	7UJMcrt,cup	1-8,32,64
&H9467	Joysticks	1-8,32,64
&H9468	eng,fnc,ctr, sht,spc	

NOTE:

spc = space
clr = clear
del = delete
cd = cursor down
cl = cursor left
crt = cursor right

eng = eng/diers
fnc = function
ctr = control
sht = shift
cup = cursor up
cr = carriage return

NOTE: All addresses are for cartridge. Disk addresses next issue.

continued next issue.

continued from p. 3

do would be to print on paper from the Sega Graph and Chart program. Is there any way of doing this?
Keith Maynard, Wellington

EDITOR'S REPLY

2. No suggestions - just gremlins.
3. See Sega Manual that comes with the printer.

---

continued from p. 10

```
9680 DATA88,"0000000309251414"
9690 DATA89,"0C6F7F6F0F"
9700 DATA90,"00000000080C0E070"
9710 DATA91,"30F0F0E0C0"
9720 DATA92,"000E0E041F1F1E1E"
9730 DATA93,"1E1E0F07"
9740 DATA94,"000020C010E00838"
9750 DATA95,"70E0C080"
9760 DATA102,"1C1C081C5E3E3E3C"
9770 DATA103,"1C1C1E1F1B1B0B19"
9780 DATA106,"1C1C081E1D1D3C1C"
9790 DATA107,"1C3E373363636630"
9800 DATA108,"00C0F03C1E070301"
9810 DATA110,"000006187BFFFFFB"
9820 DATA111,"E8C4C2C0C0C0C060"
9830 DATA112,"0703"
9840 DATA122,"383810387A7C7C3C"
9850 DATA123,"383878F8D8D8D098"
9860 DATA126,"38381078B8B83C38"
9870 DATA127,"387CECCCC6C666C"
9880 DATA128,"00006018DEFFFFDF"
9890 DATA129,"1727430303030306"
9900 DATA130,"00030F3C78E0C080"
9910 DATA132,"E0C0"
9920 PATTERNC#208,"187E8181"
9930 PATTERNC#209,"00007E5A7E243C18"
9940 PATTERNC#210,"0F10777212080707"
9950 PATTERNC#211,"0810204040404080"
9960 PATTERNC#212,"FC065656260EFCF8"
9970 PATTERNC#213,"8884828282828241"
9980 PATTERNC#214,"3F606E6464603F1F"
9990 PATTERNC#215,"1121414141414182"
10000 PATTERNC#216,"F008AEAE4810E0E0"
10010 PATTERNC#217,"1008040202020281"
10011 PATTERNC#218,"FCFCF0F0"
10020 RESTORE9000:FORR=0TO91:READP,
      P$:PATTERNS#P,P$:NEXT:P=0:P$="":
      GOTO7001
```

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Video Flipper	999,880	Andre Stokes
Yamoto	50,500	Steve Biggs

challenge these Hi-Scores by sending us yours.

continued from p. 24

Code	*Hex*	*Z80 assembler*	*– after CBh*	*– after EDh*
233	E9	jp (hl)	set 5,c	
234	EA	jp pe,NN	set 5,d	
235	EB	ex de,hl	set 5,e	
236	EC	call pe,NN	set 5,h	
237	ED		set 5,l	
238	EE	xor N	set 5,(hl)	
239	EF	rst 40	set 5,a	
240	F0	ret p	set 6,b	
241	F1	pop af	set 6,c	
242	F2	jp p,NN	set 6,d	
243	F3	di	set 6,e	
244	F4	call p,NN	set 6,h	
245	F5	push af	set 6,l	
246	F6	or N	set 6,(hl)	
247	F7	rst 48	set 6,a	
248	F8	ret m	set 7,b	
249	F9	ld sp,hl	set 7,c	
250	FA	jp m,NN	set 7,d	
251	FB	ei	set 7,e	
252	FC	call m,NN	set 7,h	
253	FD	prefixes instructions using iy	set 7,l	
254	FE	cp N	set 7,(hl)	
255	FF	rst 56	set 7,a	

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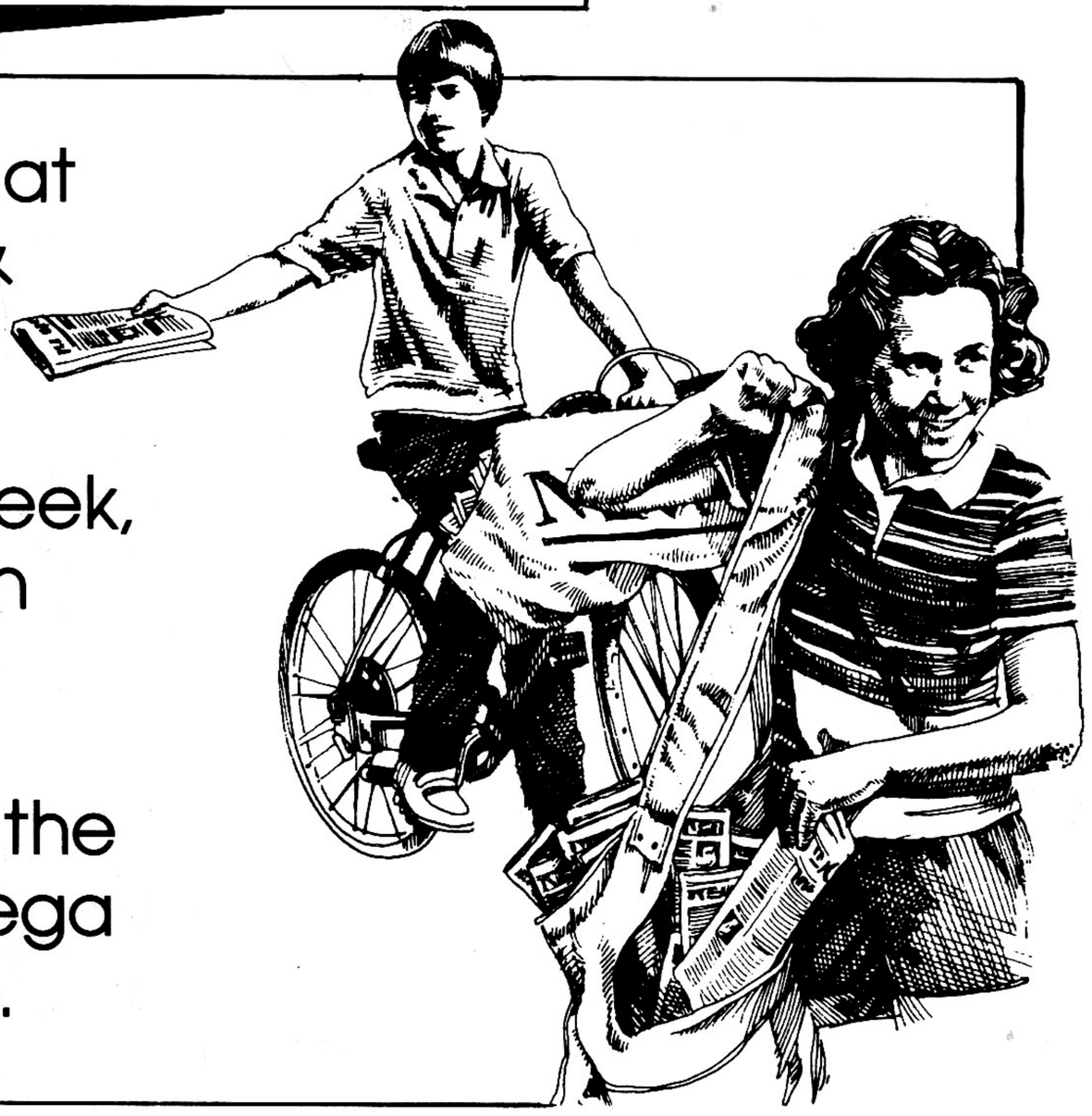

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